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THE

PHARMACOPŒIA

OF THE

UNITED STATES OF AMERICA

NINTH DECENNIAL REVISION

BY AUTHORITY OF THE
UNITED STATES PHARMACOPŒIAL CONVENTION
HELD AT WASHINGTON, D.C., MAY 10, 1910

PREPARED BY THE COMMITTEE OF REVISION AND
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PHARMACOPŒIA
OF THE
UNITED STATES OF AMERICA
NINTH DECENNIAL REVISION
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HISTORICAL INTRODUCTION

IN January, 1817, Dr. Lyman Spalding,* of New York City, submitted to the Medical Society of the County of New York a project for the formation of a National Pharmacopœia. †

Dr. Spalding's plan was as follows: The United States were to be divided into four districts—Northern, Middle, Southern, and Western; the New England States to form the Northern District; New York, New Jersey, Pennsylvania, Delaware, Maryland, and the District of Columbia, the Middle District; and the States south and west of these borders to constitute the other two districts.

The plan provided that a Convention should be called in each of these districts, to be composed of delegates from all the medical societies and schools situated within each of them. Each District Convention was to form a Pharmacopœia, and appoint delegates to a General Convention, to be held in Washington. To this General Convention the four District Pharmacopœias should be taken, and from the material thus brought together a National Pharmacopœia should be compiled. Dr. Spalding's plan was approved by the committee to which it was referred, and subsequently, through the agency of the Medical Society of the State of New York, it was carried into effect. This society issued circulars requesting the co-operation of the several incorporated State Medical Societies, the several incorporated Colleges of Physicians and Surgeons, or Medical Schools, or such medical bodies as constituted a faculty in any incorporated university or college in the United States; and in any State or Territory in which there was no incorporated medical society, college, or school, voluntary associations of physicians and surgeons were invited to assist in the undertaking.

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* Born at Cornish, N.H., June 5, 1775; died at Portsmouth, N.H., October 30, 1821.

† While European pharmacopœias were chiefly relied upon as authorities previous to the appearance of the first official Pharmacopœia of the United States of America, yet a few works had appeared, previous to this time, which deserve to be recorded here.

In 1778 there was published at Philadelphia a small Pharmacopœia for the use of the Military Hospital of the U.S. Army located at Lititz, Lancaster Co., Pennsylvania, under the title: "Pharmacopœia simpliciorum et efficaciorum, in usum nosocomii militaris, ad exercitum fœderatarum *Americæ* civitatum pertinentis; hodiernæ nostræ inopiæ rerumque angustiis, feroci hostium sævitiæ, belloque crudeli ex inopinato patriæ nostræ illato debitis, maxime accommodata." A second edition of this appeared in 1781, on the title-page of which Dr. William Brown is mentioned as author.

On October 3, 1805, the Counsellors of the Massachusetts Medical Society appointed a Committee to draft a Pharmacopœia adapted to the special wants of their section of this country. The Committee, consisting of Dr. James Jackson and Dr. John C. Warren, endeavored to secure the co-operation of medical institutions in other States, with the object of making the work national, but without success. They presented the result of their labors to the Counsellors on June 5, 1807, and the work was issued some time in the early part of 1808. It was based upon the last preceding edition of the Edinburgh Pharmacopœia, but contained much original matter, among which was a posological and prosodial table.

In 1815 the Physicians and Surgeons of the New York Hospital appointed Dr. Samuel L. Mitchill and Dr. Valentine Seaman a Committee to prepare a Pharmacopœia for the use of that institution. This was issued in 1816, and enjoyed for some years an authority of more than local character.

The following organizations approved the plan of forming a National Pharmacopœia, and appointed delegates to district conventions: Massachusetts Medical Society, June 2, 1818; College of Physicians and Surgeons in the City of New York, June 25, 1818; Medical and Chirurgical Faculty of Maryland, June, 1818; Rhode Island Medical Society, September 1, 1818; Medical Society of South Carolina, September, 1818; Medical Society of the District of Columbia, October 5, 1818; Connecticut Medical Society, October 15, 1818; Medical Institution of Yale College, October 28, 1818; Vermont Medical Society, October, 1818; Board of Physicians and Surgeons of the First Medical District of the State of Indiana, November 3, 1818; College of Physicians and Surgeons of the Western District of the State of New York, January, 1819; College of Physicians of Philadelphia, February 2, 1819; Medical Faculty of Brown University, March 15, 1819; Medical School at Lexington, Kentucky, April, 1819; New Hampshire Medical Society, May 5, 1819; Medical Society of New Jersey, May 11, 1819; Medical Society of the State of Delaware, May, 1819; Medical Society of Georgia, May, 1819.

The Medical College of Ohio and the Medical Society of New Orleans approved the formation of a National Pharmacopœia, but they did not appoint delegates.

The District Convention for the New England States was held in Boston, June 1, 1819, and a District Pharmacopœia was adopted.

The District Convention of the Middle States was held in Philadelphia, June 1, 1819, and two outlines of Pharmacopœias, submitted by the delegates from New York and Philadelphia, were formed into one, which was adopted as the Pharmacopœia of the Middle District.

There were no conventions held in the Southern and Western Districts, but measures were taken, by those concerned, to secure a representation of the Southern District in the General Convention at Washington. The General Convention for the formation of a National Pharmacopœia assembled in the Capitol, at Washington, January 1, 1820, and elected Samuel L. Mitchill, M.D., President, and Thomas T. Hewson, M.D., Secretary.

The two Pharmacopœias prepared in the Northern and Middle Districts were submitted to examination, compared in detail, and their contents, with such additions as were thought necessary, consolidated into one work, which, after full revision, was adopted by the General Convention, and ordered to be published by a committee appointed for that purpose, of which Dr. Lyman Spalding was chairman. It was published in Boston, December 15, 1820, in both the Latin and English languages, a second edition appearing in 1828.

FIRST REVISION

Before adjourning, the General Convention of 1820 made arrangements for the future revision of the work. It instructed its President to issue, on January 1, 1828, writs of election to the several incorporated State Medical Societies and incorporated Medical Colleges and Schools in the Northern District, requiring them to ballot for three delegates to a General Convention to be held at Washington on January 1, 1830, for the purpose of revising the American Pharmacopœia; and that these several institutions be requested to forward to the President, on or before April 1, 1829, the names of three persons thus designated by ballot; and the President of the Convention was requested, on the said day, to assort and count the said votes, and to notify the three persons, who should have the greatest number of votes, of their election; and, in case there should not be three persons who had a greater number of votes than others, then the said President was desired to put a ballot into the box for each of those persons who had an equal number of votes, and draw therefrom such number of ballots as should make the number of delegates three, and notify as before directed.

This resolution was to apply in like manner to the Middle, Southern, and Western Districts.

Accordingly, there were to be three delegates from each of the four districts, the Convention thus to consist of twelve delegates.

Notwithstanding the care thus exercised by the Convention of 1820 to arrange for a Convention in 1830, a serious misunderstanding occurred, the result of which was that two Pharmacopœias were published in 1830—one in New York and one in Philadelphia.

The President issued, on January 1, 1828, writs of election, as instructed by the Convention of 1820; but, on account of a certain ambiguity of expression in the resolution of the Convention of 1820, and perhaps, also, in the communication of President Mitchill addressed to the various societies and colleges, some of the organizations did not correctly understand what was expected of them, and instead of sending to President Mitchill the state of the ballot, sent to him merely its result. It appears to have been the impression in many places that the societies addressed were to choose delegates, and that the delegates thus chosen were to proceed to Washington.

President Mitchill received returns from the Northern and Middle Districts, but none from the Southern and Western Districts. He counted the ballots returned to him, as he understood that they should be counted, and notified the three chosen by each of the two districts of their election, but the appointment of the delegates for the Middle District was not satisfactory to many of the medical societies of that region.

The delegates from the Northern and Middle Districts who had been notified by President Mitchill of their election resolved, by general concurrence, and for the sake of convenience, to hold the meeting of the Convention at New York instead of Washington, as directed by the authority under which they were chosen. Eli Ives, M.D., of Yale College, Connecticut, was elected President. As they were so few in number, they adjourned for six months in order to obtain assistance from the medical fraternity of the country. They issued a circular to each of the Medical Societies and Medical Institutions in the United States not represented in the Convention, requesting each to appoint a delegate to co-operate with this Convention in revising the American Pharmacopœia; and, provided no delegate should be appointed, or, if appointed, be unable to attend, said society or medical institution or delegates were requested to communicate their ideas, in relation to the revision of the Pharmacopœia, to the Convention at their next session to be held on the first Wednesday of June, 1830, at the College of Physicians and Surgeons of New York.

The Convention met, according to agreement, in New York, June 2, 1830, ten delegates being present, representing: Connecticut, South Carolina, New York, Ohio, and Western Massachusetts. They revised the Pharmacopœia of 1820, authorized the publication of their revision, and, before adjourning, provided for a subsequent revision in 1835. The book was published in New York, November, 1830.

In consequence of the dissatisfaction existing in the Middle District, arrangements were made to hold a Convention at Washington, January, 1830, which should be more fairly representative of the medical societies, colleges, and schools of the Middle District.

The Convention was held in the Capitol, at Washington, January 4, 1830. It consisted of eight delegates, two from New Jersey, two from Philadelphia, one from Delaware, one from Maryland, and two from the District of Columbia, all members from the Middle District. Lewis Condict, M.D., of New Jersey, was elected President.

Since many sections of the United States were not represented at this Convention, and it appeared desirable that the various medical interests of the country should have their due representation, it was resolved, soon after the organization of the Convention, that the Surgeon-General of the Army, the senior surgeon of the Navy, stationed at Washington, and those Members of Congress who were practitioners of medicine, should be invited to participate in the proceedings.

In compliance with this invitation, the Surgeon-General of the Army, the senior surgeon of the Navy, and three Members of Congress took their seats in the Convention, thus increasing the number of the delegates to thirteen. The Convention appointed a Committee of Revision consisting of a Chairman and two members from each of the following cities, viz.: Boston, New York, Philadelphia, Baltimore, Washington, Charleston, Lexington, and Cincinnati.

The Chairman of the Committee was requested to open a correspondence with the several members for the purpose of submitting to their examination a revised draft of the Pharmacopœia presented to the Convention by the delegates from Pennsylvania. He was also instructed to call a meeting of the Committee in Philadelphia. Any three members were constituted a quorum for the transaction of business, and, after a careful examination of the several communications that might be submitted to them, they were to prepare a revised edition of the Pharmacopœia, and make the necessary arrangements for its publication.

The Committee performed the duty imposed upon them, and their revision of the Pharmacopœia was published in Philadelphia in 1831.

SECOND REVISION

Previous to adjournment, the Convention arranged for a Convention in 1840, by the following resolution: "*Resolved,* That the President of this Convention shall, on the first day of January, 1839, issue a notice, requesting the different incorporated State Medical Societies, the incorporated Medical Colleges, and the incorporated Colleges of Physicians and Surgeons, throughout the United States, each to elect a number of delegates, not exceeding three, to attend a General Convention to be held at Washington, D.C., on the first Monday in January, 1840."

The plan of the New York Convention for a revision of the Pharmacopœia in 1835 was abandoned. The plan of the Washington Convention for a revision in 1840 was generally recognized as the more feasible and was fully carried out.

The notices for the choice of delegates to the Convention of 1840 were issued by Lewis Condict, M.D., President of the Washington Convention of 1830, in accordance with the resolution quoted above. The Convention assembled at Washington on the first day of January, 1840, twenty delegates being present, representing the Rhode Island Medical Society, the New Jersey Medical Society, the College of Physicians of Philadelphia, the University of Pennsylvania, the Jefferson Medical College of Philadelphia, the Delaware Medical Society, the Washington University of Baltimore, the Medical and Chirurgical Faculty of Maryland, the Medical Society of the District of Columbia, the Columbian Medical College, the Vincennes Medical Society of Indiana, and the Medical Society of Georgia.

The credentials of delegates from the Medical Society of Vermont, the Medical Society of New Hampshire, the Albany Medical College, and the College of Physicians and Surgeons of Lexington, Kentucky, were presented, but the delegates did not make their appearance during the session. Lewis Condict, M.D., of New Jersey, was elected President.

With the view of giving the various medical interests of the country proper representation in the Convention, the Surgeon-General of the Army and the senior surgeon of the Navy stationed at Washington were invited to participate in the proceedings. The Convention appointed a Committee of Revision and Publication, consisting of seven members (three to form a quorum), and the meetings of the Committee to be held at Philadelphia. To this Committee were referred all communications received by the Convention from the various organizations represented. The Committee was authorized to request the coöperation of the colleges of pharmacy in the United States, and to publish the work after the completion of the revision. Valuable assistance was rendered the Committee by the Colleges of Pharmacy of Boston and New York; the Philadelphia College of Pharmacy presented a complete revised copy of the Pharmacopœia, elaborated with ability and great industry; the Committee accepted, after deliberate examination, nearly all of the suggestions, and this caused delay in the issue of the work. The book was not published until early in the year 1842. In this revision the Latin version was omitted. The process of displacement or percolation was introduced for the first time.

THIRD REVISION

Before adjourning, provision was made, by the following resolution, for a Convention in 1850:

"The President of this Convention shall, on the first day of May, 1849, issue a notice, requesting the several incorporated State Medical Societies, the incorporated Medical Colleges, the incorporated Colleges of Physicians and Surgeons, and the incorporated Colleges of Pharmacy, throughout the United States, each to elect a number of delegates, not exceeding three, to attend a General Convention to be held at Washington, on the first Monday in May, 1850."

In accordance with this resolution, the Convention met at Washington, May 6, 1850, thirty delegates being present, representing: the Rhode Island Medical Society, the Geneva Medical College, the College of Pharmacy of the City of New York, the Medical Society of New Jersey, the College of Physicians of Philadelphia, the University of Pennsylvania, the Jefferson Medical College of Philadelphia, the Medical Faculty of the Pennsylvania College, the Medico-Chirurgical College of Philadelphia, the Philadelphia College of Pharmacy, the Medical Society of Delaware, the Medical and Chirurgical Faculty of Maryland, the Medical Society of the District of Columbia, the National Medical College of the District of Columbia, the Medical Department of the National Institute, the Georgetown Medical College, and the Rush Medical College of Chicago.

The credentials of delegates from the New Hampshire Medical Institution, the University of Buffalo, the Medical Department of Hampden-Sidney College, the Medical Society of South Carolina, the Medical College of Ohio, the Cincinnati College of Pharmacy, the Missouri Medical Society, the Wisconsin State Medical Society, and the Medical Faculty of the University of Iowa were presented, but the delegates did not make their appearance during the session.

George B. Wood, M.D., of Philadelphia, was chosen President. The Surgeon-General of the Army and the Chief of the Bureau of Medicine and Surgery of the Navy Department were invited to participate in the proceedings.

The Convention appointed a Committee of Revision and Publication, consisting of the President of the Convention and three other members, three to form a quorum; the meetings of the Committee were held in Philadelphia, and the Committee published the revised work in 1851. A second edition was issued in 1855.

FOURTH REVISION

Before adjourning, the Convention of 1850 made arrangements for a Convention to be held on the first Wednesday in May, 1860, by a resolution similar to the one adopted by the Convention of 1840.

The Convention met in 1860, thirty delegates being present, representing: the Maine Medical Association, the Massachusetts Medical Society, the Massachusetts College of Pharmacy, the Connecticut State Medical Society, the Medical Society of the State of New York, the New York Academy of Medicine, the College of Pharmacy of the City of New York, the University of Pennsylvania, the Jefferson Medical College of Philadelphia, the College of Physicians of Philadelphia, the Philadelphia College of Pharmacy, the Delaware State Medical Society, the University of Maryland, the Maryland College of Pharmacy, the National Medical College of Washington, the Medical Society of the District of Columbia, the United States Army, and the United States Navy. George B. Wood, M.D., of Philadelphia, was chosen President.

A Committee of Revision and Publication was appointed, consisting of nine members, including the President of the Convention. To this Committee were referred all communications relating to the revision of the Pharmacopœia. Three members were to form a quorum. The Committee was to meet in Philadelphia, and was authorized to publish the work after its revision. The book was published in June, 1863. Before adjourning, the Convention made arrangements, by a resolution similar to that adopted by the Convention of 1850, for a Convention in 1870.

FIFTH REVISION

In accordance with this resolution, a Convention met in Washington, Wednesday, May 4, 1870, sixty delegates being present, representing: the St. Louis Medical College, the Maryland College of Pharmacy, the Missouri Medical College, the St. Louis College of Pharmacy, the Chicago College of Pharmacy, the Medical Society of the District of Columbia, the Medical College of Virginia, the Massachusetts College of Pharmacy, the Medical Society of the State of New York, the College of

Physicians of Philadelphia, the College of Pharmacy of the City of New York, the National Medical College of Washington, the University of Pennsylvania, the Jefferson Medical College of Philadelphia, the Philadelphia College of Pharmacy, the College of Pharmacy of Baldwin University, the Medico-Chirurgical Society of Louisville, the Baltimore Medical Association, the Medical Department of Georgetown College, the Washington University of Baltimore, the Massachusetts Medical Society, the Maine Medical Association, the University of Buffalo, the Medical and Chirurgical Society of Maryland, the Baltimore Medical Association, the University of Nashville, the University of Maryland, the Pharmaceutical College of Howard University, the University of Virginia, and the Woman's Medical College of Philadelphia.

Such Members of Congress as were graduates of regular medical schools, the Surgeon-General of the Army, and the Chief of the Bureau of Medicine and Surgery of the Navy Department were invited to take seats in the Convention and participate in its deliberations. Joseph Carson, M.D., of Philadelphia, was elected President of the Convention.

A Committee of Revision and Publication, consisting of fifteen members, was appointed and given definite instructions as to the general plan to be followed in revising the Pharmacopœia.

A resolution was adopted directing "that measures of capacity be abandoned in the Pharmacopœia, and that the quantities in all formulas be expressed in weights and in parts by weight." The Committee of Revision by a unanimous vote decided that the adoption of the principle of parts by weight was impracticable, and definite weights and measures were used in the Pharmacopœia.

Before adjourning, it was resolved that the rules adopted by the Convention of 1860, for the meeting of 1870, be adopted for the Convention of 1880, simply changing the dates.

The fifth revision of the Pharmacopœia was published in 1873.

SIXTH REVISION

The next Convention assembled on May 5, 1880, at Washington. There were one hundred and nine delegates accredited from ten Medical Societies, twenty-three Medical Colleges, eleven Pharmaceutical Colleges, and the medical departments of the Army, the Navy, and the Marine Hospital Service. Seventy-five delegates attended the meeting. Dr. Robert Amory, of Boston, was elected President of the Convention.

Important changes were directed at this meeting to be made in the

Pharmacopœia, the more prominent ones being the following: all articles were to be arranged in alphabetical order; a new chemical nomenclature was to be introduced; quantities were to be stated in "parts by weight," and descriptions of crude drugs and of chemicals were to be made more comprehensive and exact. Numerous tables were also directed to be added to the work. A Committee of Revision was elected, consisting of twenty-five members, and its powers and duties were expressly defined.

Regarding the call to be issued for the Convention of 1890, it was resolved that the President of the Convention of 1880 should, on or about the first day of May, 1889, issue a notice requesting the several incorporated Medical Societies, the incorporated Medical Colleges, the incorporated Colleges of Pharmacy, the incorporated Pharmaceutical Societies throughout the United States, the American Medical Association, and the American Pharmaceutical Association, each to elect a number of delegates, not exceeding three; the Surgeon-General of the Army, the Surgeon-General of the Navy, and the Surgeon-General of the Marine Hospital Service, each to appoint not exceeding three medical officers, to attend a General Convention for the Revision of the Pharmacopœia of the United States, to be held in Washington, D.C., on the first Wednesday of May, 1890.

It was also resolved that the several bodies, as well as the Medical Departments of the Army, the Navy, and the Marine Hospital Service, thus addressed, should also be requested by the President to submit the Pharmacopœia to a careful revision and to transmit the result of their labors, through their delegates, to the Committee of Revision, at least three months before the meeting of the Convention.

The several medical and pharmaceutical bodies were further to be requested to transmit to the President of the Convention of 1880 the names and residences of their respective delegates, as soon as they had been appointed; a list of whom was to be published, under his authority, for the information of the medical public, in the newspapers and medical journals, in the month of March, 1890.

Finally, it was resolved that in the event of the death, resignation, or inability of the President of the Convention to act, these duties should devolve successively, in the following order of precedence: upon the Vice-Presidents, the Secretary, the Assistant Secretary, and the Chairman of the Committee of Revision and Publication of the Pharmacopœia.

The sixth revision of the Pharmacopœia was published at the close of October, 1882.

SEVENTH REVISION

In accordance with the instructions of the Convention of 1880, the Convention for the Seventh Decennial Revision of the Pharmacopœia of the United States of America met on May 7, 1890, in the City of Washington, one hundred and seventy-five delegates being present, representing the Medical Departments of the United States Army, the United States Navy, the United States Marine Hospital Service, and fifteen Medical Societies or Associations, twenty-three Medical Colleges and Universities, twenty-five Pharmaceutical Associations, and twenty-three Colleges of Pharmacy and Universities.

Dr. Horatio C. Wood, of Philadelphia, was elected President.

It was recommended by the Convention that assay processes should be appended to the United States Pharmacopœial description of the energetic or otherwise important drugs, and to such galenical preparations as the Committee of Revision of the Pharmacopœia should deem wise, especial care being taken that the assay processes for opium and cinchona should be attended with as little manipulative difficulty as possible; that the standard of purity for drugs should not be above the point of practicability; that the strength of official tinctures and wines should be ten per cent. as far as advisable in the judgment of the Committee; that no substances protected by proprietary rights, or produced solely under a patented process, should be introduced into the Pharmacopœia.

In regard to weights and measures, the principle of parts by weight was abandoned, and the Committee of Revision was instructed to direct solids to be weighed and liquids to be measured, except in those cases in which the Committee should find it advisable to use weights only; also, that the metric system should be employed.

The Committee of Revision, consisting of twenty-six members, which was elected by the Convention, proceeded to revise the Pharmacopœia in accordance with their instructions.

Before its adjournment, the Convention for the Revision of the United States Pharmacopœia directed that the President of this Convention shall, on or about the first day of May, 1899, issue a notice requesting the several bodies represented in the Conventions of 1880 and 1890, and also such other incorporated State Medical and Pharmaceutical Associations, and incorporated Colleges of Medicine and Pharmacy, as shall have been in continuous operation for at least five years immediately preceding, to elect a number of delegates, not exceeding three, and the Surgeon-General of the Army, the Surgeon-General of the Navy, and the Surgeon-General of the Marine Hospital Service, each, to appoint, not exceeding three, medical officers, to attend a General Convention for the Revision of the Pharmacopœia of the United States, to be held in Washington, D.C., on the first Wednesday of May, 1900.

The seventh revision of the United States Pharmacopœia was published in September, 1893, and became official January 1, 1894.

EIGHTH REVISION

The Eighth Revision differed from previous revisions in the fact that the business management was entrusted to a Board of Trustees and the Committee of Revision was thus afforded more time to devote to the immediate duties of revision. On July 7, 1900, a Charter with articles of incorporation was issued by the District of Columbia to the United States Pharmacopœial Convention, with a view of giving greater stability to the organization (see page xix).

By far the most important thing in connection with the Pharmacopœia was the passage of an Act by the Congress of the United States, entitled the Food and Drugs Act, June 30, 1906. The standards adopted under this Act were those of the United States Pharmacopœia and the National Formulary. Up to the time of the passage of this Act the standards of the United States Pharmacopœia were not compulsory, except in a very few instances; in certain States and for Governmental use various States in the Union followed the action of the Federal Government and passed laws of similar import. The passage of this legislation at once *compelled* official preparations to be made in accordance with the requirements of the standards of the United States Pharmacopœia, and a far greater interest was taken in these standards in all parts of the country.

In September, 1902, there was held in the City of Brussels an important conference, entitled "Conférence Internationale pour l'Unification de la Formule des Médicaments Héroïques," which was composed of delegates from nearly every civilized country. The purpose of this body was to endeavor to formulate standards for *potent remedies* which would be adopted by the various pharmacopœias of the world, and thus there would be secured the principal object of an international pharmacopœia. The recommendations of this conference were adopted by the Committee of Revision, except in one or two instances. This has made necessary a number of changes in the strength of important official preparations (see table, page liii).

The Purity Rubric was first established in the eighth revision, the object being explained as follows: "The necessity for more accurately defining the limit of purity permissible in official chemical substances has been apparent for many years. In the Sixth Decennial Revision this question was met by inserting more definite descriptions with qualitative and quantitative tests. In the Seventh Revision will be found a still greater elaboration of this plan. In the present revision there has been added what has come to be known as the purity standard, or purity 'rubric,' which is placed in large type immediately before the description, and which defines the percentage of small quantities of permissible, innocuous impurities which do not materially affect medicinal action or interfere with pharmaceutical uses. It is believed that this plan will enable the reader to ascertain at a glance the standard which has been adopted, and which represents what the Committee believes to be obtainable, and which, on the other hand, will not prove burdensome or impossible for the manufacturer to produce without adding unnecessary and excessive cost to the consumer. The Purity Standard requirements, which limit the quantity of innocuous impurities, are, unless otherwise specified, to be understood as applying to chemical substances which are free from adherent moisture, but an allowance not exceeding 3 per cent. of moisture is permitted in non-hygroscopic crystallized chemical salts. Chemical substances in the form of powder or capillary crystals and all hygroscopic salts are to be dispensed in a condition of sensible dryness. As long as this condition is fulfilled, the moisture present is not to be regarded as an impurity.

In the case of efflorescent salts, the Purity Standard must be understood as applying only to the uneffloresced crystals, and only such should be dispensed.

In some cases it will doubtless be found that the manufacturer can slightly exceed the limit of purity, and if this be the case, no objection can be made, the language used being usually 'not less than — per cent. of pure salt.'

Inasmuch as there has existed in the past on the part of the public a misconception of the purposes of a pharmacopœia, and penalties have been imposed upon those who have sold substances bearing pharmacopœial names which were to be used in the arts, for manufacturing, and other purposes, and not as medicines, it became necessary to make the following declaration:

The standards of purity and strength prescribed in the text of this Pharmacopœia are intended to apply to substances which are used solely for medicinal purposes and when professedly bought, sold, or dispensed as such."

An advance was made in the eighth revision in the number of proximate assays and the processes themselves were made more efficient. Serum products were introduced because of their growing importance.

The long continued custom of designating United States Pharmacopœias by the decennial periods of their revision was dropped, and they were designated by the number of revisions; instead of U.S.P. 1900, which was not issued until 1905, it was called simply the "Eighth Decennial Revision."

Average doses were appended under each article, which were not intended to be compulsory, but which were to act as a guide in the administration of medicines.

The eighth revision became official from September 1st, 1905, and some additions and corrections were necessary, to June 1st, 1907, on account of the passage of the Food and Drugs Act.

General tests for heavy metals and arsenic which would apply to many chemical substances throughout the text were inserted under the head of "General Tests" in the Appendix. This saved much space and was greatly appreciated.

A Digest of Comments was authorized in this revision and the work was done under the supervision of the Public Health and Marine Hospital Service.

A Spanish translation of the Eighth Revision of the United States Pharmacopœia, in 1909, was received with much satisfaction in the Spanish-speaking countries.

ARTICLES OF INCORPORATION

IN accordance with the instructions of the United States Pharmacopœial Convention of May, 1900, the Board of Trustees directed its Chairman, Mr. W. S. Thompson, of Washington, D. C., to employ an attorney who should take out articles of incorporation for the Convention under the laws of the District of Columbia.

The first difficulty encountered was in the fact that the laws aforesaid require that a majority of the Incorporators be residents of the District of Columbia. This made it, at least, impracticable to include among these Incorporators the Officers and Committee of Revision elected by the Convention. It was then determined to ask the Committee on Credentials and Arrangements to officiate in this capacity, and the treasurer, Dr. W. M. Mew, took the place of Dr. J. E. Brackett, because of the latter's absence from the country.

These preliminaries having been arranged, the following certificate of incorporation was drawn up, signed, and recorded, finally, on the eleventh day of July, 1900:

CERTIFICATE OF INCORPORATION

This is to certify that we, whose names are hereunto subscribed, citizens of the United States, of full age, and a majority citizens of the District of Columbia, do associate ourselves together pursuant to the provisions of sections 545–552 inclusive of the Revised Statutes of the United States relating to the District of Columbia and of the act of Congress to amend the same, approved the twenty-third day of April, 1884, under the corporate name of The United States Pharmacopœial Convention.

This Association is organized for a period of nine hundred and ninety-nine years.

The particular objects and business of this Association are the encouragement and promotion of the science and art of medicine and pharmacy by selecting by research and experiment and other proper methods and by naming such materials as may be properly used as medicines and drugs with formulas for their preparation; by establishing one uniform standard and guide for the use of those engaged in the practice of medicine and pharmacy in the United States whereby the identity, strength, and purity of all such medicines and drugs may be accurately determined, and for other like and similar purposes; and by printing and distributing at suitable intervals such formulas and the results of such and similar selections, names, and determinations among the members of this Association, pharmacists, and physicians generally in the United States and others interested in pharmacy and medicine.

The management and control of the affairs, funds, and property of this Association for the first year of its existence shall be vested in a Board of Trustees consisting of the seven following persons:*

ALBERT E. EBERT.
SAMUEL A. D. SHEPPARD.
WILLIAM S. THOMPSON.
CHARLES E. DOHME.
GEORGE W. SLOAN.
HORATIO C. WOOD.
CHARLES RICE.

In testimony whereof we have hereunto set our hands and affixed our seals this seventh day of July, 1900.

† WILLIAM S. THOMPSON. [SEAL]
† G. LLOYD MAGRUDER. [SEAL]
† JOHN T. WINTER. [SEAL]
† THOMAS C. SMITH. [SEAL]
MURRAY G. MOTTER. [SEAL]
† WILLIAM M. MEW. [SEAL]
FRANK M. CRISWELL. [SEAL]

Extracts from the Constitution and By-Laws of the United States Pharmacopœial Convention.

CONSTITUTION, ARTICLE II.—MEMBERSHIP

"SECTION 1.—The members of the United States Pharmacopœial Convention, in addition to the incorporators and their associates, shall be delegates elected by the following organizations in the manner they shall respectively provide: Incorporated Medical Colleges, and Medical Schools connected with Incorporated Colleges and Universities; Incorporated Colleges of Pharmacy, and Pharmaceutical Schools connected with Incorporated Universities; Incorporated State Medical Associations; Incorporated State Pharmaceutical Associations; the American Medical Association, the American Pharmaceutical Association, and the American Chemical Society; provided that no such organization shall be entitled to representation unless it shall have been incorporated within, and shall have been in continuous operation in, the United States for at least five years before the time fixed for the decennial meeting of this corporation.

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* The laws of the District of Columbia with regard to corporations require that the Board of Trustees, or Directors, for the first year shall be named in the Certificate of Incorporation.

† Deceased.

"SECTION 2.—Delegates appointed by the Surgeon-General of the United States Army, the Surgeon-General of the United States Navy, and the Surgeon-General of the United States Marine Hospital Service, and by the organizations not hereinbefore named, which were admitted to representation in the Convention of 1900, shall also be members of the corporation. Each body and each branch of the United States Government above mentioned shall be entitled to send three delegates to the meetings of this corporation. But no such delegates as are provided for in this article shall be members until their credentials shall have been examined and acted upon as provided for by the By-Laws. Delegates admitted as members at any decennial meeting shall continue to be members of the United States Pharmacopœial Convention until their successors shall have been appointed and admitted as delegates to the ensuing Convention, and no longer."

CONSTITUTION, ARTICLE V.—MEETINGS

"The regular meetings of this corporation shall be held once in ten years. The time of holding the decennial meeting shall be upon the second Tuesday in May, in the first year in each decade ending in zero, and the place of meeting shall be in the City of Washington, D.C. The first decennial meeting shall be held in the year 1910."

BY-LAWS, CHAPTER I.—OF THE PRESIDENT

"ARTICLE VIII.—He shall issue, on or about the first of May of the year immediately preceding that of the decennial meeting, a notice inviting the several bodies, entitled under the Constitution to representation therein, to send delegates to the next meeting. He shall repeat the notification eight months later, and shall request the medical and pharmaceutical journals of the United States to publish the call for the said meeting."

ABSTRACT OF THE PROCEEDINGS OF THE NINTH DECENNIAL CONVENTION, 1910

THE first decennial meeting of the United States Pharmacopœial Convention, Incorporated (the ninth decennial convention for the revision of the Pharmacopœia), met at the New Willard Hotel, Washington, D.C., on Tuesday, May 10th, 1910, at 10 o'clock A.M., and, owing to the illness of the President, Horatio C. Wood, Sr., and the death of the First Vice-President, Albert B. Prescott, the meeting was called to order by the Second Vice-President, Otto A. Wall.

Addresses were delivered by the Honorable Charles Nagel, Secretary of Commerce and Labor, and by Senor Don Joaquin Bernardo Calvo, Envoy Extraordinary and Minister Plenipotentiary of Costa Rica. The presidential address of Dr. H. C. Wood, Sr., was read by Dr. Otto A. Wall and reports were presented by the Secretary, Henry M. Whelpley; the Treasurer, G. Wythe Cook; the Acting Chairman of the Board of Trustees, James H. Beal; and the chairman of the Committee of Revision, Joseph P. Remington.

The order of business was similar to that followed by previous Pharmacopœial Conventions. After the report of the Committee on Credentials and Arrangements, the Committee on Nominations organized and, in due course, presented nominations for officers and the members of the Committee of Revision for the ensuing decade, who were duly elected (see page xli).

The Convention then entered into a discussion on the General Principles to be followed in revising the Pharmacopœia (see page xxxi); reports and recommendations, submitted by various institutions and organizations, were referred to the Committee of Revision for its guidance; and, after the usual resolutions of thanks, the Convention adjourned, *sine die*, at noon on Thursday, May 12.

The Abstract of Proceedings of the Convention has been published in pamphlet form by the Board of Trustees and may be obtained on application, enclosing four cents postage, to Murray Galt Motter, M.D., Secretary of the Convention, who may be addressed at the Hygienic Laboratory, 25 and E Streets, Northwest, Washington, D.C.

THE MEMBERSHIP OF CONVENTION OF 1910

The Members of the U. S. Pharmacopœial Convention of 1910 consisted of the four incorporators who were living, the Officers of the Convention of 1900, the Board of Trustees, the Committee of Revision of 1900-1910 and the following registered delegates:*

U. S. GOVERNMENT SERVICES

Surgeon-General's Office, United States War Department: Walter D. McCaw, Carl R. Darnall, Frederick F. Russell.

Bureau of Medicine and Surgery, United States Navy Department: H. G. Beyer, G. L. Angeny, P. J. Waldner.

Bureau of Public Health and Marine-Hospital Service, United States Treasury Department: John F. Anderson, Reid Hunt, Martin I. Wilbert.

United States Department of Agriculture: Rodney H. True, John R. Mohler, Lyman F. Kebler.

NATIONAL ORGANIZATIONS

American Medical Association (Inc. 1897): W. A. Puckner, George H. Simmons.

American Pharmaceutical Association (Inc. 1888): Albert B. Lyons, Charles Holzhauer, Thomas F. Main.

American Chemical Society (Inc. 1877): George D. Rosengarten, L. W. Andrews, Edward Hart.

Association of Official Agricultural Chemists: W. D. Bigelow, L. P. Brown, C. E. Parker.

Association of State and National Food and Dairy Departments: Charles D. Woods, V. K. Chesnut.

National Wholesale Druggists' Association: W. J. Schieffelin, C. M. Kline, J. K. Lilly.

National Dental Association (Inc. 1906): M. F. Finley, Joseph Head.

ARKANSAS

Arkansas Medical Society (Inc. 1875): L. J. Kosminsky, William Crutcher.

Arkansas Association of Pharmacists (Inc. 1889): W. L. Dewoody, Jesse D. Hodges.

CALIFORNIA

Medical Society, State of California (Inc. 1870): A. L. Lengfeld.

COLORADO

Colorado State Medical Society (Inc. 1888): E. C. Hill, George A. Moleen.

Colorado Pharmacal Association (Inc. 1890): Charles M. Ford, S. L. Bresler.

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*This list is based upon the ruling of the Chair, from which no appeal was taken, as follows:

"The Chair feels compelled to rule that anyone elected a delegate here who has not come, is not a member of this Convention, and cannot be elected a member of any committee or as an officer."

CONNECTICUT

Connecticut State Medical Society (Inc. 1834): Samuel M. Garlick.

Yale Medical School, New Haven (Inc. 1810): Oliver T. Osborne, Clarence G. Spalding.

Connecticut Pharmaceutical Association (Inc. 1889): Charles A. Rapelye, Charles W. Whittlesey.

DELAWARE

Delaware Pharmaceutical Society (Inc. 1890): H. J. Watson, William Poole, J. T. Challenger.

DISTRICT OF COLUMBIA

Medical Society of the District of Columbia (Inc. 1819): Murray Galt Motter, John W. Chappell.

Georgetown University, School of Medicine (Inc. 1815): George M. Kober, Wilfred M. Barton.

George Washington University, Department of Medicine (Inc. 1821): Sterling Ruffin, B. M. Randolph, Noble P. Barnes.

Howard University, Medical College (Inc. 1867): William H. Seaman, J. Herve Purdy.

Howard University, Pharmaceutical College (Inc. 1867): Paul Bartsch.

George Washington University, National College of Pharmacy (Inc. 1872): Henry E. Kalusowski, Samuel L. Hilton, Lewis Flemer.

GEORGIA

Atlanta College of Physicians and Surgeons (Inc. 1898): C. C. Aven, I. W. Cummings.

Georgia Pharmaceutical Association (Inc. 1890): Max Morris, W. S. Elkin, Jr.

Atlanta College of Pharmacy (Atlanta College of Physicians and Surgeons, Department of Pharmacy) (Inc. 1874): George F. Payne, N. T. Ritter, W. F. Bedenbaugh.

University of Georgia, School of Pharmacy, Athens (Inc. 1903): Robert C. Wilson, Atherton Seidell, Thad. B. Rice.

ILLINOIS

Illinois State Medical Society (Inc. 1903): N. S. Davis.

Chicago Medical Society (Cook County) (Inc. 1897): Walter S. Haines.

Northwestern University, Medical School, Chicago (Inc. 1864): Arthur R. Edwards, John H. Long.

University of Illinois, Medical Department, College of Physicians and Surgeons of Chicago (Inc. 1881): Bernard Fantus.

Chicago College of Medicine and Surgery (Inc. 1902): Clyde M. Snow.

Illinois Pharmaceutical Association (Inc. 1880): Wilhelm Bodemann, W. C. Simpson, Herman Fry.

University of Illinois, School of Pharmacy (Chicago College of Pharmacy) (Inc. 1859): C. S. N. Hallberg, A. H. Clark, W. B. Day.

Northwestern University, School of Pharmacy (Inc. 1886): Harry Mann Gordin, Charles W. Patterson.

INDIANA

Indiana State Medical Association (Inc. 1875): Samuel Kennedy.

Indiana University, School of Medicine (Inc. 1830): C. Richard Schaefer, A. D. Thorburn.

Indiana Pharmaceutical Association (Not Inc.): Fred W. Meissner, Leo Eliel, William H. Rudder.

University of Notre Dame, School of Pharmacy, Notre Dame (Inc. 1898): J. W. Sturmer, Louis Kelley.

Purdue University, School of Pharmacy, Lafayette (Inc. 1869): Harvey W. Wiley, Ernest C. Eberhardt, Charles E. Vanderkleed.

Valparaiso University, School of Pharmacy (Inc. 1893): J. Newton Roe.

IOWA

State University of Iowa, College of Medicine, Iowa City (Inc. 1869): Charles S. Chase, Charles E. Riggs.

Iowa Pharmaceutical Association (Inc. 1888): George Judisch.

University of Iowa, College of Pharmacy, Iowa City (Inc. 1885): Wilber J. Teeters.

Highland Park College of Pharmacy, Des Moines (Inc. 1899): George A. Menge.

KANSAS

University of Kansas, School of Medicine, Lawrence (Inc. 1905): S. J. Crumbine.

Kansas Pharmaceutical Association (Inc. 1880): Frank E. Holliday, Matt. Noll, W. S. Amos.

University of Kansas, School of Pharmacy, Lawrence (Inc. 1885): L. E. Sayre.

KENTUCKY

Kentucky State Medical Association (Inc. 1855): J. N. McCormack, Virgil E. Simpson.

Kentucky Pharmaceutical Association (Inc. 1888): C. Lewis Diehl, L. A. Brown.

LOUISIANA

Tulane University, Medical Department, New Orleans (Inc. 1847): Abraham Louis Metz.

New Orleans University, Flint Medical College (Inc. 1873): W. H. Harrison.

Louisiana State Pharmaceutical Association (Inc. 1884): Philip Asher, F. C. Godbold, Adam Wirth.

New Orleans College of Pharmacy (Inc. 1900): C. D. Sauvinet, John E. Scott.

MAINE

Maine Pharmaceutical Association (Inc. 1868): Charles H. Davis.

MARYLAND

Medical and Chirurgical Faculty of Maryland (Inc. 1799): John D. Blake, Elmer R. Freeman, C. Urban Smith.

University of Maryland, School of Medicine, Baltimore (Inc. 1812): Joseph E. Gichner.

College of Physicians and Surgeons, Baltimore (Inc. 1872): John Ruräh, S. J. Fort, Harvey G. Beck.

Baltimore Medical College (Inc. 1881): William Caspari, Charles O'Donovan.

Johns Hopkins University, Medical Department (Inc. 1893): Leonard G. Rowntree.

Maryland Medical College (Inc. 1898): G. C. Dohme, W. S. Love.

Maryland Pharmaceutical Association (Inc. 1889): A. R. L. Dohme, Charles Morgan, E. F. Kelly.

University of Maryland, Department of Pharmacy, Baltimore (Inc. 1841): David M. R. Culbreth, Henry P. Hynson, Charles Caspari, Jr.

MASSACHUSETTS

Massachusetts Medical Society (Inc. 1781): Frank G. Wheatley.

Harvard Medical School: F. L. Pleadwell, J. L. Neilson, C. N. Fiske.

Tufts College Medical School, Boston (Inc. 1852): Alfred William Balch.

College of Physicians and Surgeons, Boston (Inc. 1880): I. E. Leonard.

Massachusetts Pharmaceutical Association (Inc. 1883): Charles F. Nixon, Ernest O. Engstrom, Fred A. Hubbard.

Massachusetts College of Pharmacy, Boston (Inc. 1852): Elie H. LaPierre, Irving P. Gammon, John G. Godding.

MICHIGAN

University of Michigan, Department of Medicine and Surgery, Ann Arbor (Inc. 1850): Charles W. Edmunds, Worth Hale, J. W. Trask.

Detroit College of Medicine (Inc. 1885): Walter J. Wilson, Jr., E. M. Houghton.

Michigan State Pharmaceutical Association: Leonard A. Seltzer, J. M. Francis.

University of Michigan, School of Pharmacy, Ann Arbor (Inc. 1868): J. O. Schlotterbeck, A. B. Stevens.

MINNESOTA

University of Minnesota, College of Medicine and Surgery, Minneapolis (Inc. 1888): E. D. Brown.

Minnesota State Pharmaceutical Association (Inc. 1883): John Nielson, J. W. Harrah, A. D. Thompson.

Minnesota State University, College of Pharmacy, Minneapolis (Inc. 1892): W. A. Frost.

MISSOURI

University of Missouri, School of Medicine, Columbia (Inc. 1873): W. O. Emery, H. L. Shantz, W. H. Schultz.

St. Louis Medical Society (Inc. 1834): Otto A. Wall.

Washington University, Medical School, St. Louis (Inc. 1891): Henry M. Whelpley.

Missouri Pharmaceutical Association (Inc. 1889): Charles Gietner, H. M. Pettit.

St. Louis College of Pharmacy (Inc. 1866): James M. Good, Charles E. Caspari.

NEBRASKA

University of Nebraska, College of Medicine, Lincoln (Inc. 1875): Rufus Ashley Lyman.

NEW HAMPSHIRE

New Hampshire Medical Society (Inc. 1791): C. W. Bowker.

NEW JERSEY

Medical Society of New Jersey (Inc. 1864): Henry L. Coit, Alexander Marcy, Jr., Philip Marvel.

New Jersey Pharmaceutical Association (Inc. 1874): George M. Beringer, Herman J. Lohmann, George H. White.

New Jersey College of Pharmacy, Newark (Inc. 1892): Rudolph Breves, Adolph Marquier, Philemon E. Hommell.

NEW YORK

Medical Society of the State of New York (Inc. 1807): William A. Groat, W. A. Bastedo, Samuel W. S. Toms.

Albany Medical College (Inc. 1839): Spencer Lyman Dawes.

Medical Society of the County of Kings (Inc. 1813): Murrett F. DeLorme.

Brooklyn Medical Society (Inc. 1895): Albert H. Brundage.

Long Island College Hospital, Brooklyn (Inc. 1858): Elias H. Bartley.

University of Buffalo, Medical Department (Inc. 1846): Eli H. Long, Edward J. Kiepe.

New York Academy of Medicine (Inc. 1851): Frank Sherman Meara.

Columbia College, College of Physicians and Surgeons, New York (Inc. 1807): S. W. Lambert, W. R. Williams, C. C. Leib, Jr.

University and Bellevue Hospital Medical College, New York (Inc. 1831): George B. Wallace, C. F. Claassen.

Cornell University, Medical College, New York (Inc. 1865): Robert A. Hatcher.

Syracuse University, College of Medicine (Inc. 1870): William Dewey Alsever, Frank P. Knowlton, H. L. Taylor.

New York State Pharmaceutical Association (Inc. 1879): Joseph Kahn, John Hurley, Joseph Weinstein.

Albany College of Pharmacy (Department of Pharmacy, Union University) (Inc. 1881): Alfred B. Huested, Harry B. Mason.

Kings County Pharmaceutical Society, Brooklyn (Inc. 1877): Otto Raubenheimer, Fred P. Tuthill, K. C. Mahegin.

Brooklyn College of Pharmacy (Inc. 1886): William C. Anderson, Henry W. Schimpf, A. P. Lohness.

University of Buffalo, Department of Pharmacy (Inc. 1886): Willis G. Gregory, Frank E. Lock.

Literary and Scientific Society of the German Apothecaries of the City of New York (Inc. 1867): William C. Alpers, G. C. Drobegg.

New York College of Pharmacy (Inc. 1829): Albert Plaut, George C. Diekman, Henry H. Rusby.

NORTH CAROLINA

Medical Society of the State of North Carolina (Inc. 1858): William DeB. MacNider.

North Carolina Pharmaceutical Association (Inc. 1880): W. H. Wearn.

University of North Carolina, Department of Pharmacy, Chapel Hill (Inc. 1897): E. V. Howell.

NORTH DAKOTA

North Dakota Pharmaceutical Association (Inc. 1886): Oscar Hallenberg.

OHIO

Ohio State Medical Association (Inc. 1904): Torald Sollmann, Julius Eichberg.

University of Cincinnati, Medical Department (Inc. 1852): H. Kennon Dunham.

Western Reserve University, Medical Department, Cleveland (Inc. 1884): John P. Sawyer, Richard Dexter, J. W. Kerr.

Ohio State Pharmaceutical Association (Inc. 1880): Lewis C. Hopp, Theodore D. Wetterstroem, George B. Topping.

Cincinnati College of Pharmacy (Inc. 1850): John C. Otis.

Northern Ohio Druggists' Association (Inc. 1899): Eugene R. Selzer, Virgil Coblentz.

Cleveland School of Pharmacy, Western Reserve University, Department of Pharmacy (Inc. 1895): Harry V. Arny, Joseph Feil, William T. Hankey.

Ohio State University, College of Pharmacy, Columbus (Inc. 1896): George B. Kauffman, C. A. Dye, William McPherson.

OKLAHOMA

University of Oklahoma, School of Pharmacy (Inc. 1890): Homer C. Washburn.

OREGON

Oregon Agricultural College, Department of Pharmacy (Inc. 1898): E. R. Lake, C. M. McKellips.

PENNSYLVANIA

Medical Society of the State of Pennsylvania (Inc. 1890): Adolph Koenig, Henry Beates.

Philadelphia County Medical Society (Inc. 1877): Henry W. Cattell.

College of Physicians of Philadelphia (Inc. 1789): H. C. Wood, Jr., Solomon Solis Cohen.

University of Pennsylvania, School of Medicine, Philadelphia (Inc. 1791): John Marshall.

Jefferson Medical College, of Philadelphia (Inc. 1838): H. A. Hare, J. W. Holland, E. Q. Thornton.

Medico-Chirurgical College of Philadelphia (Inc. 1867): Judson Daland, I. V. Stanley Stanislaus, Herbert J. Smith.

Temple University, Medical Department, Philadelphia (Inc. 1888): Horace Binney Morse, E. B. Rogers.

Allegheny County Medical Society, Pittsburgh (Inc. 1892): Thomas Turnbull, Jr., J. C. Burt.

University of Pittsburgh, Medical School (Inc. 1892): Albert Floyd Judd.

Pennsylvania Pharmaceutical Association (Inc. 1878): Lucius L. Walton, W. L. Cliffe, C. B. Lowe.

Philadelphia College of Pharmacy (Inc. 1822): Joseph P. Remington, Samuel P. Sadtler, Henry Kraemer.

Alumni Association of the Philadelphia College of Pharmacy (Inc. 1894): Charles H. LaWall, E. Fullerton Cook, Joseph W. England.

Temple University, Pharmacy Department, Philadelphia (Inc. 1901): H. Evert Kendig, John R. Minehart.

University of Pittsburgh, Department of Pharmacy (Inc. 1878): Julius A. Koch, James H. Beal, Louis Saalbach.

RHODE ISLAND

Rhode Island Medical Society (Inc. 1812): William J. McCaw, George M. Bailey, Charles W. Higgins.

Rhode Island Pharmaceutical Association (Inc. 1875): Howard A. Pearce, A. W. Fenner, Jr., Frank A. Jackson.

Rhode Island College of Pharmacy and Allied Sciences (Inc. 1903): James O'Hare.

SOUTH CAROLINA

South Carolina Medical Association (Inc. 1848): C. P. Aimar.

Medical College of the State of South Carolina (Inc. 1832): A. R. Taft, E. S. Burnham.

SOUTH DAKOTA

South Dakota State Pharmaceutical Association (Inc. 1893): David F. Jones, I. A. Keith, Edward C. Bent.

TENNESSEE

Tennessee Pharmaceutical Association (Inc. 1904): J. O. Burge.

University of Tennessee, School of Pharmacy (Inc. 1898): Charles O. Hill.

Vanderbilt University, Department of Pharmacy, Nashville (Inc. 1879): William R. White.

TEXAS

University of Texas, Schools of Medicine and Pharmacy (Inc. 1887): Edward Randall.

Texas Pharmaceutical Association (Inc. 1895): J. C. Buckner, E. G. Eberle, Herman Nester.

Baylor University, Pharmacy Department, Dallas (Inc. 1903): J. Connor Chisholm.

VERMONT

University of Vermont, School of Medicine (Inc.): J. N. Jenne.

VIRGINIA

Medical Society of Virginia (Inc. 1871): John Staige Davis.

University of Virginia, Department of Medicine, Charlottesville (Inc. 1825): J. A. E. Eyster, J. C. Flippin.

Medical College of Virginia, Richmond (Inc. 1854): Frank M. Reade.

University College of Medicine, Richmond (Inc. 1893): Albert Bolenbaugh, Wortley F. Rudd.

Virginia Pharmaceutical Association (Inc. 1886): C. B. Fleet, Gordon Blair.

WASHINGTON

Washington State Pharmaceutical Association (Inc.): P. Jensen.

University of Washington, School of Pharmacy (Inc. 1894): Charles W. Johnson.

WISCONSIN

State Medical Society of Wisconsin (Inc. 1841): A. S. Loevenhart.

Wisconsin Pharmaceutical Association (Inc. 1881): Otto J. S. Boberg, Edward G. Raeuber.

University of Wisconsin, School of Pharmacy (Inc. 1883): Edward Kremers.

GENERAL PRINCIPLES TO BE FOLLOWED FOR THE NINTH REVISION

1. *Scope of the Pharmacopœia.*—We recommend that the Committee of Revision be authorized to admit into the Pharmacopœia any medicinal substance of known origin, but no substance or combination of substances shall be introduced if the composition or mode of manufacture thereof be kept secret, or if it be controlled by unlimited proprietary or patent rights and the list of substances should be carefully selected, with standards for identity and purity, as far as possible. Substances used only for technical purposes should not be admitted to the next Pharmacopœia, and a statement should be placed in the preface to the effect that standards of purity and strength, prescribed in the text of the Pharmacopœia, are intended solely to apply to substances which are used for medicinal purposes or in determining the identity and purity of the same.

2. *Doses.*—We recommend that after each pharmacopœial article (drug, chemical, or preparation) which is used or likely to be used internally or hypodermically, the committee be instructed to state the average approximate (but neither a minimum nor a maximum) dose for adults, and, where deemed advisable, also for children. The metric system to be used, and the approximate equivalent in ordinary weights or measures inserted in parentheses. It is to be distinctly understood that neither this Convention nor the Committee of Revision created by it intends to have these doses regarded as obligatory on the physician or as forbidding him to exceed them whenever in his judgment this seems advisable; the Committee should be directed to make a distinct declaration to this effect in some prominent place in the new Pharmacopœia.

3. *Nomenclature.*—We recommend that changes in the titles of articles at present official be made only for the purpose of insuring greater accuracy, brevity, or safety in dispensing, and to eliminate therapeutically suggestive titles. In the case of newly admitted articles, it is recommended that such titles be chosen as are in harmony with general usage and convenient for prescribing, but in the case of chemicals of a definite composition the scientific name should be given at least as a synonym.

There should also be inserted, after each article used by physicians in prescriptions, a carefully considered abbreviated name, which may be known as an official abbreviation, in order that uniformity may be established throughout the country, with the object of preventing mistakes in reading and compounding prescriptions, and further, to serve as authorized abbreviations in labeling the store furniture of the pharmacist.

4. *Synonyms.*—We recommend that the list of synonyms should be enlarged for the next revision, and the synonyms printed in the text of the Pharmacopœia, immediately after the English name of the substance. A statement should be made in the preface of the Pharmacopœia, that substances labeled with an official synonym must comply with the same standards, tests and requirements as are demanded for the official article under any name.

5. *Purity and Strength of Pharmacopœial Articles.*—We recommend that the Committee be instructed to revise as carefully as possible the limits of purity and strength of the pharmacopœial chemicals and preparations for which limiting tests are or may be given. While no concession should be made towards a diminution of medicinal value, allowance should be made for unavoidable, innocuous impurities or variations due to the particular source or mode of preparation, or to the keeping qualities of the several articles.

The "Purity Rubric," which limits the percentage of innocuous impurities, as introduced into the Eighth Revision, should be continued, and tests and requirements should be appended to each article carrying a "Purity Rubric."

In the case of crude drugs and natural products, the limits of admissible impurities should be placed at such a figure as to exclude any that would not be accepted by other countries.

6. *International Standards.*—The International Conference for the Unification of Formulas for Potent Remedies performed a signal service for all countries by recommending the various pharmacopœias of the world to adopt certain standards for potent medicines. It is recommended that the next Committee of Revision adopt these standards, but it is believed that it would be unwise to require the acceptance of the details of pharmaceutical or other processes recommended by the International Conference.

If the finished product conforms to the International standards we believe that each country should be left free to adopt such detail and manipulation as may seem best. Nothing should prevent, however, the adoption of the recommendations of the conference, as to details, if in the opinion of the next Committee of Revision, by so doing, the Pharmacopœia can be improved.

7. *General Formulæ.*—It is recommended that general formulæ be introduced, as far as the particular nature of the several drugs will permit, for fluidextracts, tinctures and such other preparations as are made by identical processes, and that the general formula to be followed in each case be merely indicated by reference.

8. *Appending a List of Preparations in Which an Official Article is Used.*—It is recommended that, especially for the convenience of practicing physicians, there should be appended after each article in the text a list of the official preparations in which it is used.

A few exceptions may be made to this in such cases as water, alcohol, glycerin, sugar, etc.

9. *Alcoholic Percentage in Official Preparations.*—It is recommended that a range of volume content, of absolute alcohol, be stated in the Pharmacopœia, for each preparation containing alcohol.

10. *Assay Processes.*—We recommend that the Committee be instructed to introduce assay processes for as many of the potent drugs and preparations made therefrom as may be found practicable, provided that the processes of assay are reasonably simple (both as to methods and apparatus required) and lead to fairly uniform results in different hands. As regards the products of such assays, tests of identity and purity should be added wherever feasible.

It is recommended that biological tests or assays, when accurate and reliable, may be admitted.

11. *Serums and Other Biological Products.*—It is recommended that serums and other biological products, of approved usefulness, if standardized by the Government or one of the departments, may be admitted to the next Revision of the Pharmacopœia.

12. *Weights and Measures.*—It is recommended that the Committee be instructed to retain the metric system of weights and measures as adopted in the Eighth Decennial Revision.

13. *Supplement.*—It is recommended that the Committee of Revision be authorized to prepare a supplement to the Pharmacopœia at any time they may deem such action desirable.

14. *Publicity.*—It is recommended that the General Committee of Revision make public, for comment and criticism, an abstract of new descriptions and standards and of changes in descriptions and standards proposed, before final adoption.

15. *Atomic Weights.*—It is recommended that the system of atomic weights, authorized by the International Committee ($O = 16$), be adopted for the next Revision.

16. *Physical Constants.*—It is recommended that official methods for taking physical constants be inserted in the "Introductory Notices," and these shall apply to all articles in which physical constants are officially used, unless otherwise specifically excepted.

17. *Standard Temperature.*—It is recommended that the standard temperature of 25° C. (77° F.) be retained, as used in the present Revision (except in the case of alcohol), and that a table be inserted in the appendix for corresponding figures at 15° C. (59° F.).

18. *Compound Preparations.*—It is recommended that the introduction of new compound preparations be discouraged as far as possible.

19. *Pharmacognostical Descriptions.*—It is recommended that, with the description of a crude drug, there be included brief pharmacognostical descriptions, both macroscopic and microscopic where practicable, and there should be added a statement of the appearance of the structural elements in the powder, when examined microscopically, as a means of detecting adulteration.

20. *Powdered Drugs.*—It is recommended that, in the next Pharmacopœia, powdered drugs be required to represent the entire drug unless specifically stated otherwise. Where the drug can be powdered without residue this should be required; in other cases the amount of allowable tailings, gruffs, or residue should be determined and inserted in the text.

21. *Diagnostical Reagents.*—It is recommended that there be included in the next Pharmacopœia such reagents, with standards for strength and purity, as are needed for the proper execution of tests that are valuable and important in the making of a correct diagnosis.

22. *Date When the Next Pharmacopœia Becomes Official.*—It is recommended that the Committee of Revision print upon the title page of the next Pharmacopœia a definite date, reasonably distant from the actual date of publication, announcing when the new Pharmacopœia is intended to go into effect and to supersede the preceding one.

23. *Precedents.*—In all matters not especially provided for, in these "General Principles" the rules established for previous revisions, if there are any, should generally be followed.

24. *Solubilities.*—It is recommended that the degree of solubility of drugs in various solvents be given as extensively as possible.

PREFACE

THE Ninth Revision of the United States Pharmacopœia contains a number of new features and it is the purpose to include in this Preface a statement of the changes which have been made necessary by the greatly enlarged functions of the book. Under the head of "Introductory Notices," special subjects will be found in detail.

The Committee of Revision is an integral part of a chartered organization, the United States Pharmacopœial Convention. The division of the work which was made in 1900 has been continued in this revision. The Committee of Revision was relieved of attending to the business management of a general character by a Board of Trustees, and the Committee was thus given more time to devote to the actual work of revision with its voluminous detail.

Plan of Revision.—The plan of this revision has been largely that of the previous Pharmacopœia. The larger part of the work was conducted through communications by mail. A number of conferences were also held among the members of the Committee and Sub-committees, meeting at different points in the United States. Hearings were granted to groups of men having special information concerning the manufacture of various official products. These conferences have been of great value in fixing the standards. The plan of the previous revision was improved by a more systematic division of labor. The Committee was doubled in number and now consists of fifty members with the President of the Convention ex-officio. An Executive Committee consisting of fifteen members was elected to have immediate charge of the work of revision. The subjects were classified and each member of the Executive Committee was made the Chairman of a Sub-committee; the members of the General Committee being assigned to service on one or more Sub-committees. Upon general subjects and in some cases where the Executive Committee or the Chairman desired a full vote, the General Committee decided the question.

Scope.—The inclusion of the National Formulary in the Food and Drugs Act as a standard has permitted the deletion of a number of compound preparations from the Pharmacopœia. The consensus of opinion of the Committee was in effect to provide standards for vegetable drugs, chemical substances, and such pharmaceutical preparations as were simple in their character, and most largely used. A few compound preparations, however, were retained because of their large use; an increase has been made in the number of standardized serums and animal products. A number of synthetic remedies have been added to the list which the Sub-committee on Scope had recommended for admission, permission having been granted by the manufacturer, firm or corporation to include such substances; unfortunately the European War has interfered with the receipt of some answers from foreign countries. In most cases where answers were received, the replies were in the negative.

The class of preparations known as "Wines" has not been included in this revision. Wine as a menstruum or solvent can with advantage be replaced by alcohol of various strengths, and the uncertainties, due to the variability in quality and alcoholic content of the wines of commerce, are avoided.

Part II.—In the supplementary matter usually placed at the end of the text a number of changes will be noticed. This part of the book has been designated as Part II instead of Appendix as in former editions; a table of contents precedes it; and a more systematic arrangement of the subjects has been adopted. Much revision was found necessary in this part of the work, and the list of reagents has been enlarged. While a knowledge of chemical analysis is presupposed, the Committee has deemed it not out of place to add explanatory remarks or instruction in the details of manipulations in Part II.

Publicity.—For the Ninth Revision an entire change was recommended by the Convention, this was, to *publish in advance* of the issue of the book the proposed new descriptions and standards and changes in descriptions and standards with the object of informing those interested in the Pharmacopœia of the proposed changes, so that comments and criticisms might be offered. This plan has the advantage of ascertaining the views of the parties directly concerned and, although involving much labor, has been carried out; it necessarily caused some delay in the issue of the book. The Journal of the American Pharmaceutical Association undertook the publication of these detailed changes and other journals were given permission to copy the list of changes.

Food and Drugs Act. The National Food and Drugs Act, which was passed by Congress on June 30th, 1906, was followed by similar legislation in the various States of the Union. These laws make the United States Pharmacopœia and the National Formulary the standards for drugs. The National Act states:

"The term 'drug' as used in this Act, shall include all medicines and preparations recognized in the United States Pharmacopœia or National Formulary for internal or external use, and any substance or mixture of substances intended to be used for the cure, mitigation, or prevention of disease of either man or other animals."

This legislation has been the means from which a great improvement in the quality of medicines has resulted. In former revisions the Committee was embarrassed by their inability to obtain information from many sources, particularly that which manufacturers were not disposed to furnish; but with the passage of the Food and Drugs Act a great change occurred in the attitude of many manufacturers and information was tendered willingly.

Language of the Chemical Tests.—A change has been made in the method of expressing the chemical tests. The imperative mood was not used in former revisions, but since the Pharmacopœia is now a legal standard, the conditional form of previous Pharmacopœias, in which nearly every test began, "If — Gm. be dissolved," has been changed to the imperative "Dissolve — Gm., etc."

International Protocol.—These standards were referred to in the preface to the Eighth Revision (see page xvii); for a comparative table (see page liv).

Atomic Weights.—The atomic weights adopted in this revision are based upon oxygen taken as 16 (O=16) and are in accordance with the report of the International Committee on Atomic Weights for 1915. The report of the International Committee for 1916 was received too late for inclusion, as the Pharmacopœia was already in type.

General Tests.—In the chemical tests an extension has been made of the plan employed in the previous Pharmacopœia where general tests were adopted for Arsenic and Heavy Metals. The additions will be found in Part II. The adoption of this plan saves space by avoiding frequent repetition of detail in the text of Part I.

General Formulas.—This term is used to define a plan to save space and avoid repetition by printing a typical formula for galenical preparations. It will be seen that there are four type processes for fluidextracts designated by the letters, A, B, C, and D; two type processes are provided for tinctures, P and M, and also a type process for medicated waters. The Convention recommended the introduction of this plan.

Mils vs. Cc.—The term cubic centimeter has been replaced by the word mil. The United States Bureau of Standards declared that the term cubic centimeter was a misnomer, there being a slight difference between the thousandth part of a liter and the cubic centimeter, as one liter was determined to be equivalent to 1.000027 cubic decimeters. The Committee of Revision decided that the time had come to adopt the word mil, the first three letters of the whole word milliliter. In addition, the change promotes international uniformity in the two Pharmacopœias published in the English language.

Nomenclature.—The chemical and botanical nomenclature is substantially the same as that adopted for the Eighth Revision. In the case of new articles the terminology and latinization is in accord with this plan. Some botanical changes have been made in the light of further knowledge of the subject and in most cases *Natürliche Pflanzenfamilien* (Engler and Prantl) has been followed as the authority. A new feature, that of inserting abbreviations of official titles, has been introduced. It was believed that these will be of service to physicians in writing prescriptions and to pharmacists in labeling bottles for their store furniture. In the interest of international uniformity, the Chairman visited Dr. Nestor Tirard, Editor of the British Pharmacopœia, and the Commission approved the suggestion to provide abbreviations. While there are a few points of difference, the plan of having official abbreviations for English-speaking nations has been started. Uniformity in usage will minimize the danger of errors in dispensing and compounding prescriptions (see page xlvii).

Synonyms will be found following the titles and printed in small type. The Convention passed the following resolution which was adopted by the Committee of Revision: "Substances labeled with an official synonym must comply with the standards, tests, and requirements demanded for the official article." In a few cases synonyms are enclosed in quotation marks; these names, while not scientifically correct, are so largely used in commerce that it seemed wise to include them. It is understood that a synonym appearing under the title of a drug applies with equal force to any official preparation made from that drug.

Standard Temperature.—The standard temperature of 25° C. has been retained in this revision as that most suitable to the climate of the United States. Exceptions were made in the temperature for alcohol in order to correspond with the Government regulations and in that for determining refractive indices.

Structural Formulas.—For chemical substances several methods for expressing symbolic formulas have been adopted. Throughout the text empirical formulas are employed as a rule, structural characteristics being also indicated where it seems desirable. In Part II the empirical formula is usually given; in acids, the replaceable hydrogen stands first in the formula.

Lists of Official Preparations. -The Convention recommended, "That, especially for the convenience of practicing physicians, there should be appended after each article in the text a list of the official preparations in which it is used." This plan has been followed, but in the case of compound preparations, flavoring ingredients, correctives, solvents like alcohol, glycerin, and syrup have been omitted, as they would occupy a large amount of space and be of slight value to the physician.

Sterilization.—A chapter on sterilization has been introduced with the view of encouraging the production of preparations which are free from micro-organisms.

Diagnostical Reagents.—In recent years diagnosis through the use of chemical reagents and clinical tests with or without the use of the microscope has become an important factor in determining the presence or nature of disease and in this Pharmacopœia a chapter on Diagnostical Reagents and Tests has been appended.

Biological Assays.—Certain valuable and largely used drugs have so far defied the efforts of analytical chemists to provide reliable chemical tests which could be used as standards. The Committee of Revision decided to introduce biological tests, which have been in use for many years, as providing the best available method for the assay of certain drugs. A chapter on biological assays will be found in Part II. The biological assay for Pituitary Solution and Cannabis and its preparations is a requirement.

Powdered Drugs.—The Convention recommended the insertion of microscopical descriptions of powdered drugs mainly for the purpose of detecting adulteration. These will be found in the text under the drug titles. While powdered drugs, wherever possible, should represent the entire drug, it has not been found practicable to specify in each case a limit of residue or so-called gruffs or tailings, which remain when drugs are ground or powdered.

Alcoholic Percentage. The Convention recommended that a range of volume content of absolute alcohol be stated in the Pharmacopœia for each preparation containing alcohol. It was found impracticable to follow this recommendation in its entirety; the figures for alcoholic content of tinctures, elixirs and other preparations will be found in Part II.

Electrolytic Determinations.—Two metals, Mercury and Zinc, with their salts are assayed by electrolysis. This is a departure from methods used in previous Pharmacopœias. A chemical assay is also provided and the electrolytic method is given as an alternative. A chapter on this subject will be found in Part II.

Refractive Index.—Refractive indices have been added in this revision. This test is based on the deflection of a ray of light which passes from one transparent substance to another. This constant has proved a valuable addition in testing the purity of certain substances. A chapter entitled "Refractive Index" will be found in Part II.

Admissions and Deletions.—The number of articles, reagents, and assays in the present Pharmacopœia is 1436; there were 1297 in the previous Pharmacopœia. In the present book there are 782 articles in the text; 277 test solutions and volumetric solutions; 315 volumetric, gravimetric, and other assays and 62 diagnostical reagents. In the U. S. P. VIII there were 958 articles in the text, 155 test solutions and volumetric solutions, 149 volumetric assays, and 35 gravimetric assays.

Of those articles official in the text of the U.S.P. VIII, 243 have been dismissed while 67 new ones have been introduced into the U.S.P. IX (see pages lix to lxiii).

Coupon.—There will be found on the back of the title-page, as in the previous Pharmacopœia, a coupon which bears a serial number and a letter and the following words: "Pharmacopœia of the United States of America, Ninth Revision, Official Copy, Copyright."

Official Date. In accordance with the instructions of the Convention, a date has been fixed on which the present work is to supersede the Eighth Revision of the United States Pharmacopœia, and to go into effect. This date is September 1, 1916.

Assistance.—The Committee is greatly indebted to many gentlemen, who were not members, for most valuable assistance rendered either by undertaking experimental researches, sometimes very protracted and laborious, on certain subjects, or by placing material at its disposal, or by scrutinizing the proof sheets. Some have rendered aid from the beginning to the end of the revision. Especial assistance has been received from the United States Public Health Service, through the Hygienic Laboratory, and its Digest of Comments; the U. S. Bureau of Standards, and the United States Department of Agriculture, through its Bureau of Chemistry; the American Medical Association Section Reports and New and Nonofficial Remedies; American Pharmaceutical Association and its branches; American Chemical Society; American Therapeutic Society; State Pharmaceutical Associations and other Associations. Reports from the following were also sent to the Convention: New York Branch of the American Pharmaceutical Association, Washington, D. C., Branch of the American Pharmaceutical Association, Iowa Veterinary Association, Kings County Pharmaceutical Society, Medical Society of the State of New York, New Jersey College of Pharmacy, New Jersey Pharmaceutical Association, New York State Pharmaceutical Association, Philadelphia College of Pharmacy and the University of Michigan, School of Pharmacy; assistance has been tendered through reports, hearings, and communications and by pharmacists, chemists, and manufacturers (see page xliv). The editor extends his personal thanks to E. Fullerton Cook, B. A. Heims, and Joseph Rosin for continuous service, especially in correcting proof sheets and preparing copy.

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INTRODUCTORY NOTICES

UNDER this head it has been customary to include statements of a general character and intended to apply to classes of preparations, but in this revision the effort is made to confine the subjects in the Preface to a short explanation of changes of a general character which have been made, while in the Introductory Notices details of a specific character are taken up.

Title of Book.—The use of Roman numerals to designate successive revisions of the Pharmacopœia, which was introduced in the Eighth Revision, has been continued, hence the present book will be known as the "Ninth Revision" and its abbreviated form is "U. S. P. IX."

Official.—The word "official" used in this edition of the Pharmacopœia is considered to be synonymous with "pharmacopœial" and is applied to any substance or preparation recognized by the Pharmacopœia. When substances conform to the tests, assays and requirements given in the text of the Pharmacopœia, they are to be considered as official. Such tests and assays are considered sufficient for substances used as medicines.

Medicinal Substances Must Conform to U.S.P.—Owing to misconceptions on the part of those unfamiliar with pharmacopœias, it is necessary to make the following statement.

Standards of purity and strength, prescribed in the text of this Pharmacopœia, are intended solely to apply to substances which are used for medicinal purposes or in determining the identity or purity of such substances.

Some misunderstanding has also prevailed in the past with regard to the strength or purity of articles directed to be used in formulas or in testing. The words "alcohol," "syrup," "glycerin," or any other official title when used in this text and not otherwise specified is understood to mean the official article. In the case of alcohol, it is official alcohol of 94.9 per cent., by volume, that is intended and not absolute or dehydrated alcohol. "Syrup" when not otherwise specified is intended to mean syrup of the official strength and quality. Official preparations are to be made from drugs that conform to the official definitions, tests, and descriptions.

Products and Preparations Made on a Large Scale.—In the manufacture of products and preparations on the large scale, deviation from the official processes may be necessary, but the products must conform to the official requirements as determined by the tests of the U. S. Pharmacopœia, IX, and the finished preparations must be identical with those made by the official processes.

Purity Rubric.—In the Eighth Revision of this Pharmacopœia, the "purity rubric" was introduced for the first time. It is well known that absolute purity in many of the commercial chemical substances is unattainable, unnecessary, or practically undesirable on account of greatly increased expense. The analytical chemist must, of course, use chemicals for volumetric solutions and reagents of the highest possible purity, but such standards are not required in medicine or pharmacy, provided poisonous or dangerous substances are rigidly excluded. Minute quantities of innocuous products will not perceptibly affect the dosage or medicinal activity of a remedy. The figures given in the purity rubrics represent requirements that can be reasonably demanded in each instance.

In some cases it will doubtless be found that the manufacturer can slightly exceed the standard of purity, and if this be the case no objection can be made, the language used being usually "not less than . . . " Instead of using the words "absolute" or "pure" as in the Eighth Revision, the chemical formula of the substance, in symbols, is now given.

In the case of certain efflorescent chemicals, a range has been adopted which will permit a limit of efflorescence. It is to be understood that the strength of drugs or preparations for which assay processes are provided is to be determined by the official assay process and not by any other process.

It has been deemed advisable in some parts of the Pharmacopœia for greater convenience to round off decimal figures which are only given for information, as these would otherwise require the extension of decimals to an inconvenient length. For this reason in the articles on chemical substances there may be a slight difference between the requirement of the rubric and the statement at the end of the volumetric assay, but the figures given in the rubric in each case define the standards adopted for the article.

Time Limitations and Tolerances.—In some cases the allowable percentage of moisture in chemicals is specified in the text under the article. When not specified, 5 per cent. of moisture is permitted provided the chemical is dispensed in a condition of sensible dryness.

In the case of chemical tests for innocuous impurities in this Pharmacopœia (chlorides, sulphates, and others), it is understood that five minutes shall be the time allowed for the reaction to be observed except in the cases where the time is specified in the test.

In the test for carbonizable impurities, where sulphuric acid is used, it is understood that the time for observation is limited to fifteen minutes unless otherwise specified in the text.

Vegetable Drugs.—In the case of vegetable drugs, the standards provided in the text apply also to the powdered or ground drug. For the preservation of vegetable or animal substances from the ravages of insects, it is directed in special cases that they be preserved in tightly-closed containers and a few drops of chloroform or carbon tetrachloride added. It is not intended that this precaution should be used for drugs imported in bales or large original containers. This precaution is intended to aid in the preservation of drugs in the stock of a pharmacist.

Abbreviations.—To avoid the possibility of error in interpreting abbreviations, official abbreviations were introduced, using the ordinary abbreviations and specifying the exceptions, thus: The abbreviation "Sulph." is used for "Sulphate." Sulphur, sulphite and sulphide are not abbreviated. In the same way "Chlor.," unless otherwise specified, means "Chloride"; for "chlorate" the word "chloras" is used (see page xxxviii).

Tables.—The feature in the last revision of inserting tables in the Appendix (now Part II) has been continued and several additions have been made. The specific gravity tables have been based on data from the latest and most authoritative sources. In the tables for alcohol and sulphuric acid the figures given by the United States Bureau of Standards have been followed with only such changes as were necessary to reduce them to Pharmacopœial basis.

Melting Points, Boiling Points, Congealing Points.—The figures given for melting points, boiling points, and congealing points as factors in determining identity or purity have been determined according to methods which are to be found in detail in Part II. It is understood that where any of these factors are given with a range instead of a single figure that these are to be regarded as inclusive, thus: in the case of Acetanilid, "It melts between 112° and 114° C.," means that if it begins to melt at 112° or 114° C. or within these limits, it is official so far as the melting point is concerned.

Solubilities.—Solubility figures are inserted in the text as information to serve as a convenient aid in determining identity and purity approximately and are not intended to be construed as legal requirements, except in the case of volatile oils where solubilities in alcohol of different strengths are used as tests for purity. The subject of solubilities will be found under a special chapter in Part II.

In testing for solubility, slight mechanical impurities, such as fragments of filter paper, fiber, dust particles, permitted by other tests for the same substance but which slightly interfere with the transparency of the solution, are not to be construed as vitiating the test for solubility.

Non-weighable.—The term "non-weighable" in the text in the statement of ash is intended to mean a quantity which is not more than 0.0005 Gm.

Chemical Tests.—A change has been made in the method of stating the quantities to be taken for some tests and assays to conform with the general custom among chemists and to save time. A convenient quantity is taken, the word "about" being used to show that this need not be a definite quantity; this approximate quantity is then accurately weighed, and the result of the test or assay based upon the accurate weight. In those cases where the substances are corrosive, volatile, efflorescent or hygroscopic, this plan will be found especially useful.

Such phrases as "(1 in 10)" or "(1 in 20)" are understood to mean that 1 part of a liquid is to be diluted with, or a solid dissolved in, sufficient of the solvent to make 10 or 20 parts by volume. Under copper sulphate, the identity test to show the presence of sulphate reads: "Barium chloride T.S. produces a white precipitate, insoluble in hydrochloric acid, in an aqueous solution of the salt (1 in 10)"; here 1 Gm. of copper sulphate would be dissolved in sufficient distilled water to make the solution measure 10 mils.

"Absence of" and "Limit of."—The terms "absence of" and "limit of" following the tests indicating impurities are no longer used in the Pharmacopœia, Ninth Revision, as a rule; but a few exceptions may be found. Such words as (*chloride*), (*sulphate*), and (*free alkali*), in italics and parentheses, which follow tests, are merely intended to give information as to the object of the test, the words of the test itself indicating that the substance is not present in an amount which would be objectionable for medicinal use, or in other cases that it is to be absent.

Posology.—The insertion of doses has been continued in the Ninth Revision in accordance with the recommendation of the Convention. As in previous revisions, it is necessary to remind the users of this Pharmacopœia that "it is to be distinctly understood that neither the Convention nor the Committee of Revision created by it, intends to have these doses regarded as obligatory on the physician or as forbidding him to exceed them whenever in his judgment this seems advisable."

The doses are given in both the metric and apothecaries systems. The figures are not interchangeable nor are they to be considered as equivalents. Rounded figures are used in order to assist the memorizing of the figures by physicians and pharmacists. The words "average dose" are used throughout the text, and the doses are intended for adults.

Deterioration.—Deteriorations are inevitable in many official preparations which when first made comply with the tests and requirements. Limits are provided through the text in most instances for substances prone to deteriorate, through the establishment of maximum and minimum figures in the rubrics.

Temperatures

Statements of temperature are given in this Pharmacopœia in degrees of the centigrade hydrogen thermometer, the equivalent Fahrenheit temperature being given in the Tables (see Part II).

The standard temperature for solubilities, specific gravities, polarimetric determinations, and for the preparation of volumetric solutions is 25° C. (see Volumetric Solutions, Part II). For alcohol the former standard temperature of 60° F. (15.67° C.) has been retained, since the laws and regulations of the Internal Revenue Department of the United States, relating to alcohol and alcoholic liquids, are still based on this degree of temperature. For refractive indices and certain saccharimeters the temperature is 20° C. to conform to the temperature adopted by the Bureau of Standards of the United States.

By the term "gentle heat" is meant any temperature between 30° C. and 40° C.

In official formulas, "cold water" is intended to have a temperature of 15° to 25° C.; "luke warm water," 35° to 40° C.; "warm water," 60° to 70° C.; "hot water," 85° to 95° C. When the Pharmacopœia directs the use of a water bath it intends a temperature of about 100° C. In elevated localities, where the boiling point of liquid is lower than that at the level of the sea, the water bath temperature would be less than 100° C.

Weights and Measures

Metric Weights and Measures.—The Metric system of Weights and Measures is the only one recognized in the formulas of this Pharmacopœia. All standard weights and measures in this country are derived from or based upon the United States National Prototype Standards of the Meter and the Kilogramme, made of platinum-iridium, in the custody of the National Bureau of Standards at Washington. The liter is a unit of capacity equivalent to the volume occupied by the mass of 1 kilogramme of pure water at its maximum density (at a temperature of 4° C., practically) and under the standard atmospheric pressure (760 mm.). It is equivalent in volume to 1.000027 cubic decimeters.

The units of the metric system are designated by abbreviations as follows:

M. = meter
dm. = decimeter
cm. = centimeter
mm. = millimeter

Kg. = kilogramme
Gm. = gramme
dg. = decigramme
cg. = centigramme
mg. = milligramme

l. = liter
dl. = deciliter
ml. = milliliter or mil (formerly cubic centimeter or Cc.)

In measuring liquids cylindrical graduates are preferred where extreme accuracy is required but conical graduated measures are in universal use for less exacting purposes. These, if accurately graduated, are deemed suitable for the use of the pharmacist in compounding or dispensing medicines. The lower surface of the meniscus is the point from which the reading is to be taken.

Apothecaries Weights and Measures.—Physicians in prescribing, and pharmacists in dispensing medicines commonly employ the time-honored apothecaries' weights and measures which were in use in England prior to 1825, the weights being originally derived from the old English Troy weight, the fluid measures from the old wine gallon. The units of this system are designated in prescribing by signs or abbreviations as follows:

℥ = apothecaries ounce = 8 drachms = 480 grains
ʒ = drachm = 3 scruples = 60 grains
℈ = scruple = 20 grains
gr. = grain
O = pint = 16 fluidounces
f℥ = fluidounce = 8 fluidrachms = 480 minims
fʒ = fluidrachm = 60 minims
♏ = minim

In writing prescriptions in the apothecaries system, Roman, not Arabic, numerals are employed, and these are always placed after the symbol or abbreviation, thus: f℥ii; gr.xv.

In the case of metric abbreviations, the numerals precede the abbreviation, and are always written in Arabic characters, thus: 5 Gm.; 2 mils. Care is taken to distinguish the abbreviation for gramme (Gm.) from that for grain (gr.) by writing the former with a capital, the latter with a small initial.

Equivalents of Metric and Apothecaries Weights and Measures.

1 Meter is equal to 39.3700 inches (statute of July 28, 1866).

1 Pound (avoirdupois), 7000 grains, is equal to 453.5924277 grammes.

1 Liquid Gallon is equal to the volume of 231 cubic inches or 3785.3323 milliliters.

Approximate Measures.

Physicians have hitherto very commonly prescribed liquid medicines in teaspoonful, dessertspoonful or tablespoonful doses. Inasmuch as spoons vary greatly in capacity, and from their form are unfit for use in the dosage of medicine, it is desirable that the more scientific practice should be always adopted, of prescribing doses in mils, fluidrachms or minims, to be measured with a suitable medicine measure. The following are the values conventionally attached to the several approximate measures above mentioned:

Metric

A teaspoonful = 4 mils
A dessertspoonful = 8 mils
A tablespoonful = 15 mils

Apothecaries System

A teaspoonful = 1 fluidrachm
A dessertspoonful = 2 fluidrachms
A tablespoonful = ½ fluidounce

Relations Between the Various Units of Weights and Measures

1 meter = 39.3700 inches
1 yard = 0.9144018 meter
1 square yard = 0.8361307 square meter
1 cubic inch = 16.38672 mils
1 liter = 0.264178 liquid gallon
1 fluidounce = 29.5729 mils
1 kilogramme = 2.204622 pounds, avoirdupois
1 gramme = 15.432356 grains
1 avoirdupois ounce (437.5 grains) = 28.349527 grammes
1 apothecaries ounce = 31.103481 grammes
1 grain = 64.798918 milligrammes

Weight and Volume Relations

At maximum density in vacuo:

1 liter of water weighs 1 kilogramme.
1 gallon of water weighs 58416.6 grains.*
1 fluidounce of water weighs 29.5729 grammes, or 1.043154 avoirdupois ounces, or 456.3797 grains.
1 minim of water weighs 61.61025 milligrammes, or 0.950791 grains.
1 grain of water measures 0.0647989 mil, or 1.0517555 minims.

Specific Gravity

Except where otherwise stated, the specific gravity basis of this Pharmacopœia is $\frac{25^\circ\text{ C.}}{25^\circ\text{ C.}}$ (apparent), *i.e.*, the ratio of the apparent weight of a substance in air at 25° C. to that of an equal volume of pure water at the same temperature.

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[*] 1 Gallon of water weighs, in air, at 25° C., under normal conditions of humidity and atmospheric pressure, about 58185 grains; a pint 7273.1 grains; a fluidounce 454.6 grains; and a minim 0.947 grain.

International Protocol

Compared with Drugs and Preparations of U.S.P. IX

	International Protocol	U.S.P. IX
Acid Hydrocyanic, Diluted		
Acidum hydrocyanicum dilutum:		
Title	Acidum hydrocyanicum dilutum	Acidum Hydrocyanicum Dilutum.
Requirement	Strength: 2 per cent. of HCN	Strength: 1.9 to 2.1 per cent. of HCN with not more than 0.1 per cent. of HCl.
Aconite		
Aconitum Napellus (L.):		
Title	Aconiti tuber seu Tuber Aconiti	Aconitum.
Requirement	Tuber of the current year.	Assayed: 0.5 per cent. ether-soluble alkaloids. See also biological test. (Tuber of current year not required.)
Tinctura aconiti:		
Title	Aconiti tinctura seu Tinctura Aconiti	Tinctura Aconiti.
Strength	10 per cent.	100 mils from 10 Gm. (approx.).
Menstruum	Alcohol, 70 per cent.	Alcohol, 70 per cent.*
Requirement	0.05 per cent. of total alkaloids	100 mils contains 0.045 to 0.055 Gm. ether-soluble alkaloids (see also biological test).
Belladonna		
Atropa Belladonna (L.):		
Title	Belladonnæ folium seu Folium Belladonnæ	Belladonnæ Folia.
Requirement	Use only the dried leaf.	Assayed: 0.3 per cent. total alkaloids. Dried leaves and tops.
Tinctura belladonnæ:		
Title	Belladonnæ tinctura seu Tinctura Belladonnæ	Tinctura Belladonnæ Foliorum.
Strength	10 per cent.	100 mils from 10 Gm. (approx.).
Menstruum	Alcohol, 70 per cent.	Alcohol, 50 per cent.
Requirement		100 mils contains 0.027 to 0.033 Gm. alkaloids.
Extractum belladonnæ:		
Title	Belladonnæ extractum seu Extractum Belladonnæ	Extractum Belladonnæ Foliorum.
Menstruum	Alcohol, 70 per cent.	Pilular: 75 per cent. alcohol. Powdered: 95 per cent. alcohol.
Requirement	Solid extract (containing about 10 per cent. of water)	Assayed: 1.18 to 1.32 per cent. alkaloids.

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*The figures for the comparative strength in this table and alcoholic percentages are to be understood as approximate, the exact figures for each preparation will be found in the text under the head of each article.

	International Protocol	**U.S.P. IX**
Bitter Almond Water		
Aqua amygdalæ amaræ:		
Title	Amygdalæ amaræ aqua seu Aqua Amygdalæ amaræ	Aqua Amygdalæ Amaræ.
Requirement	Strength: 0.1 per cent. of HCN	Contains a mere trace of hydrocyanic acid.
Cherry Laurel Water		
Aqua laurocerasi:		
Title	Laurocerasi aqua seu Aqua Laurocerasi	Not official.
Requirement	Strength: 0.1 per cent. of HCN.	
Cocaine Hydrochloride		
Cocainæ hydrochloridum:		
Title	Cocainum hydrochloricum	Cocainæ Hydrochloridum.
Requirement	The anhydrous salt	Same as International Protocol: melts between 183° and 191° C.
Colchicum		
Colchicum autumnale (L.):		
Title	Colchici semen seu Semen Colchici	Colchici Cormus and Colchici Semen are both official.
Requirement	Use only the seed.	
Tinctura colchici:		
Title	Colchici tinctura seu Tinctura Colchici	Tinctura Colchici Seminis.
Strength	10 per cent.	100 mils from 10 Gm. (approx.).
Menstruum	Alcohol, 70 per cent.	Alcohol, 60 per cent.
Requirement		Assayed: 100 mils contains 0.036 to 0.044 Gm. colchicine.
Digitalis		
Digitalis purpurea (L.):		
Title	Digitalis folium seu Folium Digitalis	Digitalis.
Requirement	The leaf of the second year	Assayed biologically. Leaf of second year not required.
Tinctura digitalis:		
Title	Digitalis tinctura seu Tinctura Digitalis	Tinctura Digitalis.
Strength	10 per cent.	100 mils from 10 Gm. (approx.).
Menstruum	Alcohol, 70 per cent.	Alcohol, 75 per cent.
Requirement		May be assayed biologically.
Ergot		
Sclerotium clavicepitis purpureæ (Tul.) seu clavicepiti purpureæ (Tul.) sclerotium:		
Title	Secale cornutum seu Ergotum Secale	Ergota.
Requirement	Not to be more than one year old and to be kept whole	Must be dried before storing.

Ergot	**International Protocol**	**U.S.P. IX**
Extractum ergotæ:		
Title	Secaliscornutiextractum seu Extractum Secalis Cornuti; Ergoti extractum seu Extractum Ergoti	Extractum Ergotæ.
Menstruum and requirements	Prepare an aqueous extract and treat with 60 per cent. alcohol	Alcohol 85, water 15, HCl 1. Purified benzin used to extract fixed oil.
Fluidextractum ergotæ:		
Title	Secalis cornuti extractum fluidum, seu Extractum fluidum Secalis cornuti; Ergoti extractum fluidum seu Extractum fluidum Ergoti	Fluidextractum Ergotæ.
Strength	100 per cent	100 mils from 100Gm. (approx.).
Menstruum		Diluted alcohol, with 2 per cent. HCl.
Requirement		
Hyoscyamus		
Hyoscyamus niger (L.):		
Title	Hyoscyami folium seu Folium Hyoscyami	Hyoscyamus.
Requirement	Use only the leaf	Assayed: not less than 0.065 per cent. of alkaloids. Leaves and tops used.
Tinctura hyoscyami:		
Title	Hyoscyami tinctura seu Tinctura Hyoscyami	Tinctura Hyoscyami.
Strength	10 per cent	100 mils from 10 Gm. (approx.).
Menstruum	Alcohol, 70 per cent	Alcohol, 50 per cent.
Requirement		Assayed: 100 mils contains 0.0055 to 0.0075 Gm. of mydriatic alkaloids.
Extractum hyoscyami:		
Title	Hyoscyami extractum seu Extractum Hyoscyami	Extractum Hyoscyami.
Menstruum	Alcohol, 70 per cent.	Made with 75 per cent. alcohol.
Requirement	Solid extract (containing about 10 per cent. of water)	Assayed: 0.22 to 0.28 per cent. of alkaloids.
Ipecac		
Uragoga ipecacuanhæ (Baill.):		
Title	Ipecacuanhæ radix seu Radix Ipecacuanhæ	Ipecacuanha. (Rio or Cartagena.)
Requirement	Only the root bark to be used. The powder to have an alkaloidal strength of 2.0 per cent.	The whole drug to contain 1.75 per cent. of ether-soluble alkaloids.

	International Protocol	U.S.P.IX
Ipecac		
Tinctura ipecacuanhæ:		
Title	Ipecacuanhæ tinctura seu Tinctura Ipecacuanhæ	Not official.
Strength	10 per cent.	
Menstruum	Alcohol, 70 per cent.	
Requirement	....	
Syrupus ipecacuanhæ:		
Title	Ipecacuanhæ sirupus seu Sirupus Ipecacuanhæ	Syrupus Ipecacuanhæ.
Strength	10 per cent. of the tincture	Seven times stronger than the International Protocol.
Mercurial Ointment		
Unguentum hydrargyri:		
Title	Hydrargyri unguentum seu Unguentum Hydrargyri	Unguentum Hydrargyri.
Strength	30 per cent.	50 per cent. (Unguentum Hydrargyri Dilutum. U.S.P. contains about 30 per cent. of mercury.)
Nux Vomica		
Strychnos nux vomica (L.):		
Title	Strychni semen seu Semen Strychni seu Nux vomica	Nux Vomica.
Requirement	2.5 per cent. total alkaloids	Assayed: 2.5 per cent. of the alkaloids.
Tinctura nucis vomicæ:		
Title	Strychni tinctura seu Tinctura Strychni; Nucis vomicæ tinctura seu Tinctura Nucis vomicæ	Tinctura Nucis Vomicæ.
Strength	10 per cent.	100 mils from 10 Gm. (approx.).
Menstruum	Alcohol, 70 per cent.	Alcohol, 75 per cent.
Requirement	0.25 per cent. total alkaloids	Assayed: 100 mils contains 0.237 to 0.263 Gm. of the alkaloids.
Extractum nucis vomicæ:		
Title	Strychni extractum seu Extractum Strychni; Nucis vomicæ extractum seu Extractum Nucis vomicæ	Extractum Nucis Vomicæ.
Menstruum	Alcohol, 70 per cent.	Powdered extract made with 75 per cent. alcohol.
Requirement	16 per cent. total alkaloids	Assayed: 15.2 to 16.8 per cent. of the alkaloids.
Opium		
Opium:		
Title	Opii pulvis seu Pulvis Opii	Opii Pulvis.
Requirement	Powder to be dried at 60° C.; morphine 10 per cent.	Assayed: Powdered Opium 10 to 10.5 per cent. anhydrous morphine.

Opium	**International Protocol**	**U.S.P. IX**
Extractum opii:		
Title	Opii extractum seu Extractum Opii	Extractum Opii.
Requirement	Morphine 20 per cent.	Assayed: 19.5 to 20.5 per cent. anhydrous morphine.
Tinctura opii:		
Title	Opii tinctura seu Tinctura Opii	Tinctura Opii.
Strength	10 per cent.	100 mils from 10 Gm. (approx.).
Menstruum	Alcohol, 70 per cent.	Alcohol, 50 per cent.
Requirement	Morphine 1 per cent.	100 mils contains 0.95 to 1.05 Gm. anhydrous morphine.
Tinctura opii crocata:		
Title	Opii tinctura crocata seu Tinctura Opii crocata seu Laudanum Sydenhami	Not official.
Strength	10 per cent. opium.	
Menstruum		
Requirement	Morphine 1 per cent.	
Pulvis ipecacuanhæ et opii:		
Title	Opii et Ipecacuanhæ pulvis compositus seu Pulvis Doveri	Pulvis Ipecacuanhæ et Opii.
Requirement	To contain 10 per cent. of powdered opium	Ipecac 10, powdered opium 10, sugar of milk 80.
Tinctura opii camphorata:		
Title	Opii tinctura benzoica seu Tinctura Opii benzoica	Tinctura Opii Camphorata.
Requirement	Morphine, 0.05 per cent.	100 mils contains 0.4 Gm. powdered opium.
Phenol Water		
Aqua phenolata:		
Title	Phenoli solutio seu Aqua phenolata	Not official.
Requirement	Strength: 2 per cent.	
Sodium Arsenate		
Sodii arsenas:		
Title	Arsenas sodii seu Sodii arsenas; Arsenicicum natrium seu Natrium arsenicicum	Sodii Arsenas.
Requirement	The crystallized salt containing 36.85 per cent. of arsenic acid	Contains 58.98 to 61.92 per cent. anhydrous sodium arsenate.
Solution of Potassium Arsenite		
Liquor potassii arsenitis:		
Title	Arsenicalis liquor Fowleri seu Liquor arsenicalis Fowleri seu Kalii arsenicosi liquor	Liquor Potassii Arsenitis.
Requirement	Strength in arsenious acid, 1 per cent.	Contains potassium arsenite corresponding in amount to not less than 0.975 nor more than 1.025 per cent. of arsenic trioxide.

	International Protocol	U.S.P. IX
Syrup of Ferrous Iodide		
Syrupus ferri iodidi:		
Title	Ferri iodidi sirupus seu Sirupus iodati ferrosi seu Sirupus ferri iodati	Syrupus Ferri Iodidi.
Requirement	Strength in anhydrous ferrous iodide 5 per cent.	Contains 4.75 to 5.25 per cent. of ferrous iodide.
Tincture of Cantharides		
Tinctura cantharidis:		
Title	Cantharidis tinctura seu Tinctura Cantharidis	Tinctura Cantharidis.
Strength	10 per cent	100 mils from 10 Gm. (approx.).
Menstruum	Alcohol, 70 per cent.	Alcohol, 95 per cent.
Requirement		
Tincture of Iodine		
Tinctura iodi:		
Title	Iodi tinctura seu Tinctura iodi	Tinctura Iodi.
Strength	10 per cent	Iodine 7 Gm., potassium iodide 5 Gm. in 100 mils.
Menstruum	Alcohol, 95 per cent.	Alcohol, 90 per cent.
Requirement		
Tincture of Lobelia		
Tinctura lobeliæ:		
Title	Lobeliæ tinctura seu Tinctura Lobeliæ	Tinctura Lobeliæ.
Strength	10 per cent	100 mils from 10 Gm. (approx.).
Menstruum	Alcohol, 70 per cent	Alcohol, 50 per cent.
Requirement		
Tincture of Strophanthus		
Tinctura strophanthi:		
Title	Strophanthi tinctura seu Tinctura Strophanthi	Tinctura Strophanthi.
Strength	10 per cent.	100 mils from 10 Gm. (approx.).
Menstruum	Alcohol, 70 per cent.	Alcohol, 95 per cent.
Requirement	Seeds not to be freed from fat	Assayed biologically. Purified benzin used to extract fixed oil.
Wine of Antimony		
Vinum antimonii:		
Title	Antimoniale vinum seu Vinum antimoniale; Stibiatum vinum seu Vinum stibiatum	Not official.
Strength	In tartar emetic, 0.4 per cent.	
Requirement		

Admissions, Deletions and Changes

ARTICLES ADDED TO PART I, U.S.P. IX

Acidum Phenylcinchoninicum
Æthylmorphinæ Hydrochloridum
Agar
Aqua Destillata Sterilisata
Aspidosperma
Betaeucainæ Hydrochloridum
Bismuthi Betanaphtholas
Caffeinæ Sodio-Benzoas
Calcii Glycerophosphas
“ Lactas
Cotarninæ Hydrochloridum
Creosoti Carbonas
Diacetylmorphina
Diacetylmorphinæ Hydrochloridum
Diastasum
Emetinæ Hydrochloridum
Emplastrum Cantharidis
“ Elasticum
“ Resinæ
Extractum Aconiti
“ Fellis Bovis
“ Gelsemii
“ Hydrastis
“ Viburni Prunifolii
Fluidextractum Aspidospermatis
“ Sabal
Glucosum
Hydrargyri Salicylas
Hydrastinæ Hydrochloridum
Hypophysis Sicca
Liquor Hypophysis
“ Sodii Chloridi Physiologicus
“ “ Glycerophosphatis
Magma Bismuthi
Magma Magnesiæ
Nitrogenii Monoxidum
Oleoresina Petroselini
Oleum Pini Pumilionis
“ Sesami
Oxygenium
Paraformaldehydum
Petroselinum
Phenolphthaleinum
Potassa Sulphurata
Quininæ Dihydrochloridum
“ et Ureæ Hydrochloridum
“ Tannas
Scammoniæ Radix
Serum Antidiphthericum Purificatum
“ “ Siccum
“ Antitetanicum
“ “ Purificatum
“ “ Siccum
Sodii Benzosulphinidum
“ Cacodylas
“ Cyanidum
“ Glycerophosphas
“ Indigotindisulphonas
“ Perboras
“ Sulphis Exsiccatus
Terra Silicea Purificata
Theobrominæ Sodio-Salicylas
Theophyllina
Toxitabellæ Hydrargyri Chloridi Corrosivi
Trinitrophenol
Uranii Nitras
Virus Vaccinicum

ARTICLES DISMISSED FROM U.S.P. VIII

Acetum Opii
Acidum Camphoricum
" Nitricum Dilutum (Part II)
" Sulphurosum (Part II)
Æther Aceticus (Ethyl Acetate, Part II)
Aloe Purificata
Alumini Sulphas
Amygdala Amara
Anthemis
Apocynum
Argenti Cyanidum
" Nitras Mitigatus
Benzinum
Berberis
Bismuthi Citras
Bromum (Part II)
Calamus
Calcii Phosphas Præcipitatus
" Sulphas Exsiccatus
Calendula
Carbo Animalis
" " Purificatus
Carbonei Disulphidum (Part II)
Cassia Fistula
Cataplasma Kaolini
Ceratum Camphoræ
" Plumbi Subacetatis
" Resinæ Compositum
Chimaphila
Chirata
Chloralformamidum
Cinnaldehydum
Coca
Collodium Stypticum
Confectio Rosæ
" Sennæ
Conium
Convallaria
Cusso
Cypripedium
Elastica
Elixir Ferri, Quininæ et Strychninæ Phosphatum
Emplastrum Adhæsivum
" Hydrargyri
" Opii
" Saponis
Emulsum Chloroformi
" Olei Morrhuæ cum Hypophosphitibus
Euonymus
Eupatorium
Extractum Aloes
" Digitalis
" Euonymi
" Hæmatoxyli
" Krameriæ
" Leptandræ
" Quassiæ
" Scopolæ
Fel Bovis Purificatum
Ferri Citras
" et Ammonii Sulphas (Part II)
" " " Tartras
" " Potassii "
" " Quininæ Citras
" " Strychninæ Citras
" Hydroxidum
" Hypophosphis
" Pyrophosphas Solubilis
Ficus
Fluidextractum Apocyni
" Berberidis
" Calami
" Calumbæ
" Capsici
" Chimaphilæ
" Chiratæ
" Cocæ
" Conii
" Convallariæ
" Cubebæ
" Cypripedii
" Euonymi
" Eupatorii
" Geranii

Fluidextractum Hamamelidis Foliorum
“ Krameriæ
“ Lappæ
“ Leptandræ
“ Lupulini
“ Matico
“ Mezerei
“ Pareiræ
“ Phytolaccæ
“ Pruni Virginianæ
“ Quassiæ
“ Quercus
“ Quillajæ
“ Rhois Glabræ
“ Rubi
“ Sabinæ
“ Sanguinariæ
“ Scopolæ
“ Scutellariæ
“ Serpentariæ
“ Stramonii
“ Valerianæ
“ Viburni Opuli
Geranium
Glyceritum Ferri, Quininæ et Strychninæ Phosphatum
Gossypii Cortex
Hæmatoxylon
Hamamelidis Cortex
“ Folia
Hedeoma
Hyoscyaminæ Sulphas
Infusum Pruni Virginianæ
Iodolum
Kaolinum
Krameria
Lappa
Leptandra
Limonis Succus
Liquor Antisepticus
“ Chlori Compositus (Part II)
“ Hydrargyri Nitratis
“ Sodii Phosphatis Compositus
Lithii Benzoas
“ Citras Effervescens
“ Salicylas
Lupulinum
Magnesii Sulphas Effervescens
Mangani Hypophosphis
“ Sulphas (Part II)
Marrubium
Mastiche
Matico
Mistura Ferri Composita
“ Rhei et Sodæ
Morphinæ Acetas
Mucilago Sassafras Medullæ
“ Ulmi
Naphthalenum
Oleatum Atropinæ
“ Cocainæ
“ Quininæ
“ Veratrinæ
Oleoresina Lupulini
Oleum Adipis
“ Æthereum
“ Copaibæ
“ Erigerontis
“ Hedeomæ
“ Rosæ
“ Sabinæ
Pareira
Physostigminæ Sulphas
Phytolacca
Pilulæ Aloes et Ferri
“ “ “ Mastiches
“ “ “ Myrrhæ
“ Catharticæ Vegetabiles
“ Laxativæ Compositæ
“ Opii
“ Podophylli, Belladonnæ et Capsici
Pimenta
Piperina
Plumbi Iodidum
“ Nitras (Part II)
Potassii Cyanidum
“ Dichromas (Part II)
“ Ferrocyanidum (Part II)
“ Sulphas (Part II)
Prunum
Pulvis Acetanilidi Compositus
“ Morphinæ “
Quercus
Quillaja
Rhus Glabra
Rubus

Sabina
Safrolum
Salvia
Santonica
Sassafras Medulla
Scammonium
Scoparius
Scopola
Scutellaria
Sodii Bisulphis (Part II)
" Chloras
" Nitras
" Pyrophosphas
" Sulphis
Spiritus Ætheris Compositus
" Ammoniæ
" Frumenti
" Gaultheria
" Vini Gallici
Sulphuris Iodidum
Syrupus Amygdalæ
" Calcis
" Ferri, Quininæ et Strychninæ Phosphatum
" Hypophosphitum Compositus
" Krameriæ
" Rosæ
" Rubi
Talcum
Tamarindus
Terebinthina
" Canadensis
Tinctura Aloes et Myrrhæ
Tinctura Calendulæ
" Cimicifugæ
" Gallæ
" Herbarum Recentium
" Ipecacuanhæ et Opii
" Krameriæ
" Quillajæ
" Serpentariæ
" Vanillæ
Trochisci Gambir
" Glycyrrhizæ et Opii
" Krameriæ
" Santonini
Unguentum Hydrargyri Oxidi Rubri
" Potassii Iodidi
" Veratrinæ
" Zinci Stearatis
Vanilla
Viburnum Opulus
Vinum Album
" Antimonii
" Cocæ
" Colchici Seminis
" Ergotæ
" Ferri
" " Amarum
" Ipecacuanhæ
" Opii
" Rubrum
Zea
Zinci Bromidum
" Iodidum

ARTICLES ADDED TO PART II, U.S.P. IX

Reagents, Test Solutions, and Volumetric Solutions

Acetic Acid Anhydride
Acetone
Ammonia, Spirit of
Ammonium Nitrate
“ Polysulphide T.S.
“ Vanadate
Aniline Sulphate
“ “ T.S.
Arsenic Acid
“ “ T.S., Concentrated
“ Trioxide
Asbestos
Azolitmin
“ T.S.
Azur II
“ II-Eosin
Barium Chloride
“ Hydroxide
“ Nitrate
Beef Extract
Benzidine
Betaiminazolylethylamine Hydrochloride
Blood Serum
Bromine
Cadmium and Potassium Iodide
“ Chloride
“ “ T.S.
“ Iodide
Canada Turpentine
Carbon Tetrachloride
Carmine
Cobaltous Chloride
“ “ T.S.
Congo Red
“ “ T.S.
Cupric Acetate
“ “ T.S.
Curare
Dimethylaminoazobenzene
Diphenylamine
Eosin A
Ether, Dehydrated
Ethyl Acetate
Ferric Ammonium Sulphate
Ferrous Sulphate (Acid) T.S.
Filter Paper, Quantitative
Fluorescein
Fuchsin
“ Acid
Fuchsin-Sulphurous Acid T.S.
Glass Wool
Glucose, Dry
Gold Chloride
“ “ T.S., Diluted
Hematein
Hematoxylin
Hydrated Chloral T.S.
Indigo Carmine T.S.
Iodeosin
Iodine, Purified
Iodo-bromide T.S.
Lævomethylaminoethanolcatechol
Lead Acetate Glass Wool
“ “ Test Paper
“ “ T.S., Alcoholic
“ Nitrate
“ Peroxide
Lime, Freshly Slaked
Magnesium Chloride
Manganese Sulphate
“ “ T.S.
Mercuric Bromide
“ “ Test Paper
“ “ T.S., Alcoholic
Methyl Orange
“ Red
“ “ T.S.
“ Violet 6B
Methylene Green
Molybdic Acid
Naphthylamine (Alpha) Hydrochloride
“ “ “ T.S.
“ (Beta) “

Nitric Acid, Diluted
Oil of Cedarwood
Orange G
Orcin
Ouabain
Palladous Chloride
Paradimethylaminobenzaldehyde
Peptone
Phenoldisulphonic Acid T.S.
Phenylhydrazine
" Dihydrochloride
" Hydrochloride
Phloroglucinol
" T.S.
Phosphotungstic Acid
Platinic Chloride
Potassium Chromate
" Ferricyanide
" Hydroxide T.S., Special
" Sulphate
Pyrogallol T.S., Alkaline
Resorcinol T.S.
Rosaniline Acetate
Rosolic Acid
" " T.S.
Sawdust, Purified
Selenous Acid
Silver, Metallic
" Sulphate
Sodium Acetate, Anhydrous
" Bisulphite
" " T.S.
Sodium Bitartrate
" Carbonate, Anhydrous
" Chloride
" Cyanide T.S.
" Hypobromite T.S.
" Nitroprusside
" Oxalate
" Phospho-tungstate T.S.
" Sulphide
" " T.S.
" Tartrate, Neutral
" Tungstate
Stannous Chloride
" " T.S., Acid
" " T.S., Saturated
Starch (Potato)
Succinic Acid
Sulphanilic Acid
Sulpho-salicylic Acid
Sulphuric Acid, Fuming
" " Purified and Concentrated for Tests
Sulphurous Acid
Toluol
Xylol
Yeast
Zinc Dust
" Oxide
Tenth-Normal Barium Hydroxide V.S.
Half-Normal Potassium Hydroxide V.S.
Hundredth-Normal Silver Nitrate V.S.
Two-Hundredth-Normal Sodium Thiosulphate V.S.

Diagnostical Reagents and Clinical Tests

Agar-Agar, Glycerin
" " Glucose
" " Lactose-litmus
" " Plain
Alcoholic Solution of Dimethylaminoazobenzene
" " " Iodine (1 per cent.)
" " " " (10 " ")
" " " Methyl Violet 6B
" " " Methylthionine Chloride (Saturated)
Aloin (isobarbaloin containing barbaloin)
Alum-hematoxylon Solution
Aniline Water and Methyl Violet 6B Solution
Aqueous Solution of Trinitrophenol (Saturated)
Bial's Reagent
Borax Methylene Blue Solution
Bouillon, Glucose
" Plain
" Stock
Carminfibrin
Congo Red Test Paper
Diluted Carbolfuchsin Solution
Ebner's Fluid

Ehrlich's Solution for Diazo Reaction
“ “ “ Urobilinogen
“ Triacid Stain
Esbach's Reagent
Ether (containing Hydrogen Dioxide)
Gelatin, Glucose
“ Plain
Giemsa's Stain
Gram's Iodine Solution
Günzburg's Reagent
Hayem's Solution
Iodine Potassium Iodide Solution
Jenner's Stain
Löffler's Methylene Blue Solution
“ Mixture (Blood Serum)
Mayer's Hemalum
Mixture of Zinc Acetate
Nitric Acid (containing a trace of nitrous acid)
“ “ Solution for Decolorizing
Nylander's Reagent
Obermeyer's Solution
Oxygenated Oil of Turpentine
Pavy's Solution
Solution for Hemoglobin Estimation
“ “ White Corpuscles
“ of Calcium Chloride
“ “ Carbolfuchsin
“ “ Carbol Methyl Violet
“ “ Chlorinated Lime (Saturated)
“ “ Copper Sulphate
“ “ Guaiac
“ “ Lead Acetate
“ “ Rosolic Acid
“ “ Sodium Hydroxide (for Sugar Reaction)
“ “ Sodium Hypobromite
“ “ Zinc Chloride (10 per cent.)
Spiegler-Jolles Reagent
Toison's Solution
Wright's Stain
Yeast (for fermentation test)

ARTICLES DISMISSED FROM APPENDIX, U.S.P. VIII

Barium Carbonate
Brazil-Wood T.S.
Cobaltous Nitrate T.S.
Indigo T.S.
Iodine T.S., Alcoholic
Lead Acetate Test Gauze
Mercuric Chloride Test Paper
“ “ T.S., Alcoholic
Methyl Alcohol
Naphthylamine Acetate T.S.
Potassium Cyanide T.S.
Sodium Nitrite

CHANGES IN OFFICIAL LATIN TITLES

U.S.P. VIII	U.S.P. IX
Alcohol Absolutum	Alcohol Dehydratum
Aqua Hydrogenii Dioxidi	Liquor Hydrogenii Dioxidi
Calx Sulphurata	Calcii Sulphidum Crudum
Cannabis Indica	Cannabis
Cardamomum	Cardamomi Semen
Charta Sinapis	Emplastrum Sinapis
Elixir Adjuvans	Elixir Glycyrrhizæ
Extractum Cannabis Indicæ	Extractum Cannabis
" Rhamni Purshianæ	" Cascaræ Sagradæ
Ferri et Quininæ Citras Solubilis	Ferri et Quininæ Citras
" Phosphas Solubilis	" Phosphas
Fluidextractum Cannabis Indicæ	Fluidextractum Cannabis
" Rhamni Purshianæ	" Cascaræ Sagradæ
" Rhamni Purshianæ Aromaticum	" Cascaræ Sagradæ Aromaticum
" Veratri	" Veratri Viridis
Glandulæ Suprarenales Siccæ	Suprarenalum Siccum
" Thyroideæ "	Thyroideum "
Hyoscinæ Hydrobromidum	Scopolaminæ Hydrobromidum
Methylthioninæ Hydrochloridum	Methylthioninæ Chloridum
Oleum Aurantii Corticis	Oleum Aurantii
" Betulæ	Methylis Salicylas
" Cinnamomi	Oleum Cassiæ
" Gaultheriæ	Methylis Salicylas
" Lavandulæ Florum	Oleum Lavandulæ
" Picis Liquidæ	" Picis Liquidæ Rectificatum
Resina Scammonii	Resina Scammoniæ
Rhamnus Purshiana	Cascara Sagrada
Tinctura Cannabis Indicæ	Tinctura Cannabis
" Veratri	" Veratri Viridis
Veratrum	Veratrum Viride

CHANGES IN OFFICIAL ENGLISH TITLES

U.S.P. VIII	U.S.P. IX
Acetanilide	Acetanilid
Wool-Fat	Wool Fat
Hydrous Wool-Fat	Hydrous Wool Fat
Absolute Alcohol	Dehydrated Alcohol
Sulphurated Lime	Crude Calcium Sulphide
Indian Cannabis	Cannabis
Cardamom	Cardamom Seed
Cloves	Clove
Mustard Paper	Mustard Plaster
Adjuvant Elixir	Elixir of Glycyrrhiza
Extract of Indian Cannabis	Extract of Cannabis
Soluble Iron and Quinine Citrate	Iron and Quinine Citrate
" Ferric Phosphate	Ferric Phosphate
Fluidextract of Cannabis Indicæ	Fluidextract of Cannabis
" " Veratrum	" " Veratrum Viride
Desiccated Suprarenal Glands	Dried Suprarenals
" Thyroid "	" Thyroids
Hyoscine Hydrobromide	Scopolamine Hydrobromide
Methylthionine Hydrochloride	Methylthionine Chloride
Oil of Orange Peel	Oil of Orange
" " Betula	Methyl Salicylate (from Betula)
" " Gaultheria	" Salicylate (from Gaultheria)
" " Lavender Flowers	Oil of Lavender
" " Tar	Rectified Oil of Tar
Tincture of Cannabis Indica	Tincture of Cannabis
" " Veratrum	" " Veratrum Viride
Blue Ointment	Diluted Mercurial Ointment
Veratrum	Veratrum Viride

Comparative Table showing the Strength of the More Important Pharmacopœial Substances and Preparations in the Preceding and in the Present Pharmacopœia

Title.	Chief Constituent.	U. S. P. 8th Revision.	U. S. P. 9th Revision.
Acidum Aceticum	Acetic Acid	not less than 36 per cent.	from 36 to 37 per cent. $C_2H_4O_2$.
“ “ Dilutum	“ “	“ “ “ 6 “ “	“ 5.7 to 6.3 “ “ $C_2H_4O_2$.
“ Benzoicum		no assay	not less than 99.5 per cent. $C_7H_6O_2$.
“ Boricum		not less than 99.8 per cent.	“ “ “ 99.5 “ “ H_3BO_3.
“ Hydriodicum Dilutum	Hydriodic Acid	“ “ “ 10 “ “	from 9.5 to 10.5 per cent. HI.
“ Hydrobromicum “	Hydrobromic Acid	“ “ “ 10 “ “	“ 9.5 to 10.5 “ “ HBr.
“ Hydrochloricum	Hydrochloric “	“ “ “ 31.9 “ “	“ 31 to 33 “ “ HCl.
“ “ Dilutum	“ “	“ “ “ 10 “ “	“ 9.5 to 10.5 “ “ HCl.
“ Hydrocyanicum “	Hydrocyanic “	“ “ “ 2 “ “	“ 1.9 to 2.1 “ “ HCN.
“ Hypophosphorosum	Hypophosphorous Acid	“ “ “ 30 “ “	“ 30 to 32 “ “ H_3PO_2.
“ “ Dilutum	“ “	“ “ “ 10 “ “	“ 9.5 to 10.5 “ “ H_3PO_2.
“ Lacticum	Lactic Acid	“ “ “ 75 “ “ of lactic acid without anhydrides	lactic acid and lactic anhydrides equivalent to from 85 to 90 per cent. $C_3H_6O_3$.
“ Nitricum	Nitric “	not less than 68 per cent	from 67 to 69 per cent. HNO_3.
“ Phosphoricum	Phosphoric Acid	“ “ “ 85 “ “	“ 85 to 88 “ “ H_3PO_4.
“ “ Dilutum	“ “	“ “ “ 10 “ “	“ 9.5 to 10.5 “ “ H_3PO_4.
“ Salicylicum		no assay	not less than 99.3 “ “ $C_7H_6O_3$.
“ Sulphuricum	Sulphuric “	not less than 92.5 per cent.	from 93 to 95 “ “ H_2SO_4.
“ “ Aromaticum	“ “	“ “ “ 20 “ “	“ 19 to 21 “ “ H_2SO_4.
“ “ Dilutum	“ “	“ “ “ 10 “ “	“ 9.5 to 10.5 “ “ H_2SO_4.
“ Trichloraceticum		no assay.	not less than 99 per cent. $C_2HO_2Cl_3$.
Aconitum	Ether-soluble alkaloids of aconite	not less than 0.5 per cent. aconitine	“ “ “ 0.5 per cent. ether-soluble alkaloids; biological assay recommended.
Æther	Ethyl oxide	about 96 per cent.	from 95.5 to 97.5 per cent. $(C_2H_5)_2O$.

Alcohol Dilutum	Alcohol	about 41.5 per cent. by weight. " 48.9 " " by volume	from 41 to 42 per cent. by weight. " 48.4 to 49.5 " " by volume, C_2H_5OH.
Alumen Exsiccatum		not less than 99 per cent.	not less than 96.5 per cent. $AlK(SO_4)_2$ or $AlNH_4(SO_4)_2$.
Ammonii Bromidum		" " " 97 " "	not less than 98.5 per cent. NH_4Br.
" Carbonas		yielding not less than 31.58 per cent. NH_3	yielding from 30 to 32 per cent. NH_3.
" Iodidum		not less than 97 per cent.	not less than 99 per cent. NH_4I.
Antimonii et Potassii Tartras		" " " 99.5 " "	" " " 98.5 " " $K(SbO)C_4H_4O_6+\frac{1}{2}H_2O$.
Aqua Ammoniæ	Ammonia gas	" " " 10 " "	from 9.5 to 10.5 per cent. NH_3.
" " Fortior	" "	" " " 28 " "	" 27 to 29 " " NH_3.
Argenti Nitras		" " " 99.9 " "	not less than 99.8 per cent. $AgNO_3$.
" " Fusus		" " " 94.8 " "	" " " 94.5 " " $AgNO_3$.
" Oxidum		" " " 99.8 " "	" " " 99.6 " " Ag_2O.
Arseni Iodidum		" " " 82.7 " "iodine " " " 16.3 " "arsenic	" " " 99 " " AsI_3.
Asafœtida	Alcohol-soluble constituents	gum-resin—not less than 50 per cent.	gum-resin—not less than 60 per cent. of alcohol-soluble constituents. powder—not less than 50 per cent. of alcohol-soluble constituents.
Bismuthi et Ammonii Citras	Bismuth oxide	from 46 to 50 per cent.	from 46 to 52 per cent. Bi_2O_3.
" Subnitras	" "	not less than 80 per cent.	not less than 79 per cent. Bi_2O_3.
Bromoformum		99 per cent.	about 96 per cent. $CHBr_3$.
Caffeina Citrata	Caffeine	no assay	not less than 48 per cent.
" " Effervescens	"	" "	" " " 1.9 " "
Calcii Bromidum		not less than 97 per cent. (anhydrous form)	" " " 84 " " $CaBr_2$ (hydrated form).
" Carbonas Præcipitatus		not less than 99 per cent.	not less than 98 per cent. $CaCO_3$.

Comparative Table showing the Strength of the More Important Pharmacopœial Substances and Preparations in the Preceding and in the Present Pharmacopœia—*Continued*

Title.	Chief Constituent.	U.S.P. 8th Revision.	U.S.P. 9th Revision.
Calcii Chloridum		not less than 99 per cent (anhydrous form)	not less than 75 per cent. $CaCl_2$ (hydrated form).
Calx		not less than 90 per cent	not less than 95 per cent. CaO.
Cannabis		no assay	biological assay required.
Cantharis	Cantharidin	“ “	not less than 0.6 per cent. of cantharidin.
Chloralum Hydratum		“ “	not less than 99.5 “ “ $C_2HCl_3O+H_2O$.
Chromii Trioxidum		not less than 90 per cent	not less than 95 per cent. CrO_3.
Cinchona	Cinchona alkaloids	“ “ “ 5 “ “ total anhydrous cinchona alkaloids and at least 4 per cent. anhydrous ether-soluble alkaloids	“ “ “ 5 “ “ total alkaloids.
Codeinæ Phosphas		65 per cent. anhydrous codeine	not less than 67 per cent. anhydrous codeine.
Creta Præparata		no assay	not less than 97 per cent. $CaCO_3$.
Cupri Sulphas		not less than 99.5 per cent	from 62.97 to 66.79 per cent. anhydrous $CuSO_4$ (not less than 98.5 per cent. $CuSO_4+5H_2O$).
Digitalis		leaves from plants of second year's growth, at commencement of flowering	biological assay recommended.
Emplastrum Belladonnæ	Alkaloids from belladonna leaves	from 0.38 to 0.42 per cent. mydriatic alkaloids.	from 0.35 to 0.40 per cent. of alkaloids from belladonna leaves.

Extractum Belladonnæ Foliorum	Alkaloids from belladonna leaves	1.4 per cent. mydriatic alkaloids	from 1.18 to 1.32 per cent. of alkaloids from belladonna leaves.
“ Cannabis		no assay	biological assay required.
“ Colchici Cormi	Colchicine	1.4 per cent	from 1.25 to 1.55 per cent. of colchicine.
“ Hyoscyami	Alkaloids from hyoscyamus	0.3 “ “ mydriatic alkaloids	“ 0.22 to 0.28 “ “ “ the alkaloids from hyoscyamus.
“ Nucis Vomicæ	Alkaloids from nux vomica	5 “ “ strychnine	“ 15.2 to 16.8 per cent. of alkaloids from nux vomica.
“ Opii	Anhydrous morphine	20 “ “ crystallized morphine	“ 19.5 to 20.5 per cent. of anhydrous morphine.
“ Physostigmatis	Alkaloids from physostigma	2 per cent. ether-soluble alkaloids	“ 1.7 to 2.3 per cent. of the alkaloids from physostigma.
“ Stramonii	Alkaloids from stramonium	1 per cent. mydriatic alkaloids	“ 0.9 to 1.1 per cent. of the alkaloids from stramonium.
Ferri Chloridum	Iron	22 “ “	corresponding to 20 per cent. Fe.
“ et Ammonii Citras	“	16 “ “	“ to 16 to 18 per cent. Fe.
“ et Quininæ “	“ and quinine	not less than 13.5 per cent. iron and 11.5 per cent. dried quinine	“ to 11.5 to 13 per cent. Fe and not less than 11.5 per cent. anhydrous quinine.
“ Sulphas		not less than 99.5 per cent.	from 54.36 to 57.07 per cent. anhydrous $FeSO_4$ (not less than 99.5 per cent. $FeSO_4+7H_2O$).
“ Sulphas Exsiccatus		no assay	not less than 80 per cent. anhydrous $FeSO_4$.
Fluidextractum Aconiti	Ether-soluble alkaloids from aconite	100 mils contains 0.4 Gm. of aconitine	100 mils contains 0.45 to 0.55 Gm. of the ether-soluble alkaloids of aconite; biological assay recommended.
“ Belladonnæ Radicis	Alkaloids from belladonna root	100 mils contains 0.4 Gm. mydriatic alkaloids	100 mils contains 0.405 to 0.495 Gm. of the alkaloids from belladonna root.

Comparative Table showing the Strength of the More Important Pharmacopœial Substances and Preparations in the Preceding and in the Present Pharmacopœia—*Continued*

Title.	Chief Constituent	U. S. P. 8th Revision.	U. S. P. 9th Revision.
Fluidextractum Cannabis		no assay	biological assay required.
" Cinchonæ	Cinchona alkaloids	100 mils contains 4 Gm. of anhydrous ether-soluble alkaloids	100 mils contains 4 to 5 Gm. of the alkaloids from cinchona.
" Colchici Seminis	Colchicine	100 mils contains 0.4 Gm. colchicine	100 mils contains 0.36 to 0.44 Gm. of colchicine.
" Digitalis		no assay	biological assay recommended.
" Guaranæ	Caffeine	100 mils contains 3.5 Gm. of alkaloids from guarana	100 mils contains 3.6 to 4.4 Gm. of caffeine.
" Hydrastis	Ether-soluble alkaloids from hydrastis	100 mils contains 2 Gm. hydrastine	100 mils contains 1.8 to 2.2 Gm. of the ether-soluble alkaloids.
" Hyoscyami	Alkaloids from hyoscyamus	100 mils contains 0.075 Gm.	100 mils contains 0.055 to 0.075 Gm. of the alkaloids from hyoscyamus.
" Ipecacuanhæ	Ether-soluble alkaloids from ipecac	100 " " 1.5 Gm.	100 mils contains 1.8 to 2.2 Gm. of the ether-soluble alkaloids from ipecac.
" Nucis Vomicæ	Alkaloids from nux vomica	100 " " 1 Gm. strychnine	100 mils contains 2.37 to 2.63 Gm. of the alkaloids from nux vomica.
" Pilocarpi	Alkaloids from pilocarpus	100 mils contains 0.4 Gm.	100 mils contains 0.55 to 0.65 Gm. of the alkaloids from pilocarpus.
" Scillæ		no assay	biological assay recommended.
Glyceritum Hydrastis	Ether-soluble alkaloids from hydrastis	" "	100 mils contains 1.12 to 1.37 Gm. of the ether-soluble alkaloids from hydrastis.
Guarana	Caffeine	not less than 3.5 per cent. alkaloidal principles	not less than 4 per cent of caffeine.

Hydrargyri Chloridum Mite		not less than 99.5 per cent.	not less than 99.6 per cent. HgCl.
" Iodidum Flavum		" " " 99.5 " "	" " " 99 " " HgI.
" Iodidum Rubrum		" " " 98.5 " "	" " " 99 " " HgI_2.
Hydrargyrum		" " " 99.9 " "	" " " 99.5 " " Hg.
" cum Creta	Mercury	38 per cent.	from 37 to 39 per cent. Hg.
Hyoscyamus	Alkaloids from hyoscyamus	not less than 0.08 per cent.	not less than 0.065 per cent. of the alkaloids from hyoscyamus.
Iodum		99 per cent.	99.5 per cent. iodine.
Jalapa	Resins of jalap	not less than 7 per cent. total resin, of which not more than 15 per cent. should be soluble in ether.	not less than 7 per cent. total resins of jalap.
Linimentum Camphoræ	Camphor	20 per cent.	from 19.5 to 20.5 per cent. of camphor.
Liquor Acidi Arsenosi	Arsenic trioxide	corresponding to 1 per cent.	corresponding to 0.975 to 1.025 per cent. As_2O_3.
" Arseni et Hydrargyri Iodidi		1 per cent. arsenous iodide. 1 " " mercuric iodide.	from 0.95 to 1.05 per cent. AsI_3. " 0.95 to 1.05 " " HgI_2.
" Ferri Chloridi	Ferric Chloride	corresponding to 10 per cent. of iron	corresponding to 10 to 11 per cent. Fe.
" " Subsulphatis	Basic ferric sulphate	corresponding to not less than 13.57 per cent. of iron	corresponding to 13 to 14 per cent. Fe.
" " Tersulphatis	Normal ferric sulphate	corresponding to not less than 10 per cent. of iron	corresponding to 10 to 11 per cent. Fe.
" Iodi Compositus	Iodine	5 per cent. iodine. 10 " " potassium iodide.	from 4.8 to 5.2 per cent. iodine. " 9.8 to 10.2 " " KI.
" Magnesii Citratis	Magnesium citrate	no assay	corresponding to not less than 1.5 Gm. MgO in 100 mils.
" Plumbi Subacetatis	Lead subacetate	not less than 25 per cent. of lead subacetate	lead subacetate corresponding to not less than 18 per cent. Pb.

Comparative Table showing the Strength of the More Important Pharmacopœial Substances and Preparations in the Preceding and in the Present Pharmacopœia—*Continued*

Title.	Chief Constituent.	U.S.P. 8th Revision.	U.S.P. 9th Revision.
Liquor Potassii Arsenitis	Potassium arsenite	potassium arsenite corresponding to 1 per cent. of arsenic trioxide	potassium arsenite corresponding to 0.975 to 1.025 per cent. As_2O_3.
" " Hydroxidi	" hydroxide	about 5 per cent.	not less than 4.5 per cent.
" Sodæ Chlorinatæ	Available chlorine	at least 2.4 per cent.	" " " 2.5 " "
" Sodii Arsenatis	Sodium arsenate	not less than 1 per cent. exsiccated salt	from 0.975 to 1.025 per cent. Na_2HAsO_4.
" " Hydroxidi	" hydroxide	about 5 per cent.	not less than 4.5 per cent. NaOH.
" Zinci Chloridi	Zinc chloride	" 50 " "	49 to 51 per cent.
Lithii Bromidum		not less than 97 per cent. when dried	not less than 85 per cent. LiBr.
Magnesii Carbonas		magnesium carbonate corresponding to not less than 38.4 per cent. of magnesium oxide	magnesium carbonate and hydroxide corresponding to not less than 39.2 per cent. MgO and not more than 0.8 per cent. CaO.
" Oxidum		not less than 96 per cent	not less than 96 per cent. MgO, nor more than 2 per cent. CaO.
" " Ponderosum		same as magnesii oxidum	same as magnesii oxidum.
" Sulphas		not less than 99.7 per cent. crystallized salt	from 48.59 to 53.45 per cent. anhydrous $MgSO_4$ (not less than 99.5 per cent. $MgSO_4 + 7H_2O$).
Maltum		no assay	capable of converting 5 times its weight of starch into sugars.
Massa Ferri Carbonatis		" "	not less than 35 per cent. $FeCO_3$.
" Hydrargyri	Mercury	33 per cent	from 32 to 34 per cent. of Hg.

Methylis Salicylas		no assay	not less than 98 per cent. $CH_3C_7H_5O_3$.
Nux Vomica	Alkaloids from nux vomica	not less than 1.25 per cent. strychnine	not less than 2.5 per cent. of the alkaloids of nux vomica.
Oleum Cajuputi	Cineol	not less than 55 “ “	no assay.
“ Cari	Carvone	no assay	not less than 50 per cent. of carvone.
“ Caryophylli	Eugenol	not less than 80 per cent.	“ “ “ 82 “ “ of eugenol.
“ Cassiæ (Oleum Cinnamomi U.S.P. VIII)	Cinnamic aldehyde	“ “ “ 75 “ “	“ “ “ 80 “ “ of cinnamic aldehyde.
“ Eucalypti	Eucalyptol	“ “ “ 50 “ “	not less than 70 per cent. of eucalyptol (cineol).
“ Menthæ Piperitæ	Menthol	not less than 6 per cent. of esters calculated as menthyl acetate and not less than 50 per cent. of total menthol	not less than 5 per cent. of esters calculated as $C_{10}H_{19}C_2H_3O_2$ and not less than 50 per cent. of $C_{10}H_{19}OH$.
“ “ Viridis	Carvone	no assay	not less than 43 per cent.
Opii Pulvis	Morphine	12 to 12.5 per cent. crystallized morphine	10 to 10.5 per cent. anhydrous morphine.
Opium	“	not less than 9 per cent. crystallized morphine	not less than 9.5 per cent. anhydrous morphine.
“ Deodoratum	“	12 to 12.5 per cent. crystallized morphine	10 to 10.5 per cent. anhydrous morphine.
“ Granulatum	“	12 to 12.5 per cent. crystallized morphine	10 to 10.5 per cent. anhydrous morphine.
Phenol		not less than 96 per cent	not less than 97 per cent C_6H_5OH.
“ Liquefactum		“ “ “ 86.4 “ “ phenol	“ “ “ 87 “ “ C_6H_5OH.
Phosphorus		“ “ “ 99.5 “ “	no assay.
Pilocarpus	Alkaloids from pilocarpus	0.5 per cent.	0.6 per cent. of the alkaloids from pilocarpus.
Pilulæ Ferri Carbonatis		no assay	each pill contains not less than 0.06 Gm. $FeCO_3$.

Comparative Table showing the Strength of the More Important Pharmacopœial Substances and Preparations in the Preceding and in the Present Pharmacopœia—*Continued*

Title.	Chief Constituent.	U.S.P. 8th Revision.	U.S.P. 9th Revision.
Plumbi Acetas		not less than 99.5 per cent.	from 85.31 to 89.57 per cent. anhydrous $Pb(C_2H_3O_2)_2$ (not less than 99.5 per cent. $Pb(C_2H_3O_2)_2+3H_2O$).
Podophyllum	Resin of podophyllum.	no assay	not less than 3 per cent. of resin.
Potassii Acetas		not less than 98 per cent.	“ “ “ 99 “ “ $KC_2H_3O_2$.
“ Bitartras		“ “ “ 99 “ “	“ “ “ 99.5 “ “ $KHC_4H_4O_6$.
“ Bromidum		“ “ “ 97 “ “	“ “ “ 98.5 “ “ KBr.
“ Carbonas		“ “ “ 98 “ “	“ “ “ 99 “ “ K_2CO_3.
“ et Sodii Tartras		“ “ “ 99 “ “	from 73.71 to 77.39 per cent. of anhydrous $KNaC_4H_4O_6$ (not less than 99 per cent. $KNaC_4H_4O_6+4H_2O$).
Pulvis Effervescens Compositus		no assay	from 23 to 27 per cent. sodium bicarbonate; from 73 to 78 per cent. potassium and sodium tartrate.
Resorcinol		“ “	not less than 99.5 per cent. $C_6H_4(OH)_2$.
Scilla		“ “	biological assay recommended.
Sodii Acetas		not less than 99.5 per cent.	from 59.97 to 62.96 per cent. anhydrous $NaC_2H_3O_2$ (not less than 99.5 per cent. $NaC_2H_3O_2+3H_2O$).
“ Arsenas		“ “ “ 98 “ “	from 58.98 to 61.92 per cent. anhydrous Na_2HAsO_4 (not less than 99 per cent. $Na_2HAsO_4+7H_2O$).

“ Boras		“ “ “ 99 “ “	from 52.32 to 54.92 per cent. anhydrous $Na_2B_4O_7$ (not less than 99 per cent. $Na_2B_4O_7+10H_2O$).
“ Bromidum		“ “ “ 97 “ “	not less than 98.5 per cent. NaBr.
“ Citras		“ “ “ 97 “ “	“ “ “ 98 “ “ $Na_3C_6H_5O_7+2H_2O$.
“ Iodidum		“ “ “ 98 “ “	not less than 99 per cent. NaI.
“ Nitris		“ “ “ 90 “ “	“ “ “ 95 per cent. $NaNO_2$.
“ Phenolsulphonas		“ “ “ 99 “ “	from 83.64 to 87.82 per cent. anhydrous $NaC_6H_5O.SO_3$ (not less than 99 per cent. $NaC_6H_5O.SO_3+2H_2O$).
“ Phosphas		“ “ “ 99 “ “	from 39.25 to 44 per cent. anhydrous Na_2HPO_4 (not less than 99 per cent. $Na_2HPO_4+12H_2O$).
“ “ Exsiccatus		“ “ “ 99 “ “	not less than 98 per cent. Na_2HPO_4.
“ Sulphas		“ “ “ 99 “ “	from 43.64 to 48 per cent. anhydrous Na_2SO_4 (not less than 99 per cent. $Na_2SO_4+10H_2O$).
“ Thiosulphas		“ “ “ 98 “ “	from 63.07 to 67.48 per cent. anhydrous $Na_2S_2O_3$ (not less than 99 per cent. $Na_2S_2O_3+5H_2O$).
Spiritus Ætheris Nitrosi	Ethyl nitrite	“ “ “ 4 “ “	from 3.5 to 4.5 per cent. $C_2H_5NO_2$.
“ Glycerylis Nitratis	Glyceryl trinitrate	1 per cent.	“ 1 to 1.1 “ “ $C_3H_5(NO_3)_3$.
Strontii Bromidum		not less than 97 per cent.	not less than 98 per cent. $SrBr_2+6H_2O$.
“ Iodidum		“ “ “ 98 “ “	not less than 99 per cent. SrI_2+6H_2O.
“ Salicylas		“ “ “ 98.5 “ “	not less than 99 per cent. $Sr(C_7H_5O_3)_2+2H_2O$.
Strophanthus		no assay	biological assay recommended.

Comparative Table showing the Strength of the More Important Pharmacopœial Substances and Preparations in the Preceding and in the Present Pharmacopœia—*Continued*

Title.	Chief Constituent.	U.S.P. 8th Revision.	U.S.P. 9th Revision.
Sulphur Sublimatum		not less than 99 per cent.	not less than 99.5 per cent. sulphur.
Suprarenalum Siccum (Glandulæ Suprarenales Siccæ U.S.P. VIII)		no assay	from 0.4 to 0.6 per cent. epinephrine; biological assay recommended.
Syrupus Acidi Hydriodici	Hydriodic Acid	about 1 per cent. or about 1.19 Gm. in 100 mils	100 mils contains 1.3 to 1.45 Gm. HI.
“ Ferri Iodidi	Ferrous Iodide	about 5 per cent. or about 6.74 Gm. in 100 mils	from 4.75 to 5.25 per cent. FeI_2.
Thymolis Iodidum	Iodine	45 per cent.	not less than 43 per cent. iodine.
Thyroideum Siccum (Glandulæ Thyroideæ Siccæ U.S.P. VIII)	“	no assay	from 0.17 to 0.23 per cent. iodine in thyroid combination.
Tinctura Aconiti	Ether-soluble alkaloids from aconite	100 mils contains 0.045 Gm. aconitine	100 mils contains 0.045 to 0.055 Gm. of the ether-soluble alkaloids from aconite; biological assay recommended.
“ Belladonnæ Foliorum	Alkaloids from belladonna leaves	100 mils contains 0.03 Gm.	100 mils contains 0.027 to 0.033 Gm. of the alkaloids from belladonna leaves.
“ Cannabis		no assay	biological assay required.
“ Cinchonæ	Alkaloids from cinchona	100 mils contains 0.75 Gm. anhydrous ether-soluble alkaloids	100 mils contains 0.8 to 1 Gm. of the alkaloids from cinchona.
“ “ Composita	“ “ “	no assay	100 mils contains 0.4 to 0.5 Gm. of the alkaloids from cinchona.
“ Colchici Seminis	Colchicine	100 mils contains 0.04 Gm.	100 mils contains 0.036 to 0.044 Gm. of colchicine.
“ Digitalis		no assay	biological assay recommended.

“ Ferri Chloridi	Ferric Chloride	13.28 per cent. anhydrous salt, corresponding to 4.6 (4.58) per cent. metallic iron	about 13 per cent. $FeCl_3$, corresponding to not less than 4.48 per cent. Fe.
“ Hydrastis	Ether-soluble alkaloids from hydrastis	100 mils contains 0.4 Gm. hydrastine	100 mils contains 0.36 to 0.44 Gm. of the ether-soluble alkaloids from hydrastis.
“ Hyoscyami	Alkaloids from hyoscyamus	100 mils contains 0.007 Gm. mydriatic alkaloids	100 mils contains 0.0055 to 0.0075 Gm. of the alkaloids from hyoscyamus.
“ Iodi	....	100 mils contains 7 Gm. of iodine and 5 Gm. of potassium iodide	100 mils contains 6.5 to 7.5 Gm. of iodine and 4.5 to 5.5 Gm. KI.
“ Kino	....	100 mils contains 5 Gm. kino	100 mils contains 10 Gm. kino.
“ Nucis Vomicæ	Alkaloids from nux vomica	100 mils contains 0.1 Gm. strychnine	100 mils contains 0.237 to 0.263 Gm. of the alkaloids of nux vomica.
“ Opii	Morphine	100 mils contains 1.2 to 1.25 Gm. crystallized morphine	100 mils contains 0.95 to 1.05 Gm. anhydrous morphine.
“ “ Deodorati	“	100 mils contains 1.2 to 1.25 Gm. crystallized morphine	100 mils contains 0.95 to 1.05 Gm. anhydrous morphine.
“ Physostigmatis	Alkaloids from physostigma	100 mils contains 0.014 Gm. ether-soluble alkaloids	100 mils contains 0.013 to 0.017 Gm. of the alkaloids from physostigma.
“ Scillæ	....	no assay	biological assay recommended.
“ Stramonii	Alkaloids from stramonium	100 mils contains 0.025 Gm. mydriatic alkaloids	100 mils contains 0.0225 to 0.0275 Gm. of the alkaloids from stramonium.
“ Strophanthi	....	no assay	biological assay recommended.
Unguentum Hydrargyri	Mercury	not less than 49 per cent	from 49 to 51 per cent. of Hg.
“ “ Dilutum	“	about 33 per cent	“ 29 to 31 “ “ “ Hg.
“ Phenolis	Phenol	3 per cent	about 2 per cent.

Comparative Table showing the Strength of the More Important Pharmaceutical Substances and Preparations in the Preceding and in the Present Pharmacopœia—*Continued*

Title.	Chief Constituent.	U.S.P. 8th Revision.	U.S.P. 9th Revision.
Zinci Acetas		not less than 99.5 per cent.	from 83.16 to 87.32 per cent. anhydrous $Zn(C_2H_3O_2)_2$ (not less than 99.5 per cent. $Zn(C_2H_3O_2)_2+2H_2O$).
" Carbonas Praecipitatus		corresponding to not less than 72 per cent. zinc oxide	corresponding to not less than 68 per cent. ZnO.
" Chloridum		not less than 99.5 per cent.	not less than 95 per cent. $ZnCl_2$.
" Phenolsulphonas		" " " 99.5 " "	from 73.7 to 77.4 per cent. anhydrous $Zn(C_6H_5O.SO_3)_2$ (not less than 99.5 per cent. $Zn(C_6H_5O.SO_3)_2 + 8H_2O$).
" Stearas		no assay	corresponding to 13 to 15.5 per cent. ZnO.
" Sulphas		not less than 99.5 per cent.	from 55.86 to 58.65 per cent. anhydrous $ZnSO_4$ (not less than 99.5 per cent. $ZnSO_4+7H_2O$).

THE PHARMACOPŒIA OF THE UNITED STATES OF AMERICA

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PART I

ACACIA

Acacia

Acac.—Gum Arabic

The dried gummy exudation of *Acacia Senegal* Willdenow, and of other African species of *Acacia* (Fam. *Leguminosæ*).

In ovoid, more or less spheroidal tears, or in broken, angular fragments from 2 to 30 mm. in diameter, varying from white or yellowish-white to light amber-colored; translucent; very brittle; fractured surface glass-like, sometimes iridescent; nearly inodorous; taste insipid, mucilaginous.

Insoluble in alcohol; slowly and almost completely soluble in twice its weight of water, forming a mucilaginous liquid, which has a slight, characteristic odor and is acid to litmus. When either 0.1 mil of basic lead acetate T.S., or 0.1 mil of a concentrated solution of sodium borate, or 0.1 mil of ferric chloride T.S. is added to 10 mils of a 10 per cent. aqueous solution of Acacia, a gelatinous precipitate is produced. The precipitate produced with ferric chloride T.S. is neither black nor brownish-black (*tannin*).

The powder is whitish, with few or no starch grains or fragments of vegetable tissues.

Not more than 1 per cent. of powdered Acacia is insoluble in water (*plant tissues, sand, or dirt*).

Acacia yields not more than 4 per cent. of ash, and the powder contains not more than 15 per cent. of moisture.

Preparations—Mucilago Acaciæ   Syrupus Acaciæ.

ACETANILIDUM

Acetanilid

Acetanil.—Acetanilide   Antifebrin

The monoacetyl derivative [C_8H_9ON or $C_6H_5NH.CH_3CO = 135.08$] of aniline.

Acetanilid occurs in colorless, shining, micaceous, crystalline laminæ, or as a crystalline powder; odorless, having a slightly burning taste; permanent in the air.

One Gm. of Acetanilid dissolves in 190 mils of water, 3.4 mils of alcohol, 3.7 mils of chloroform, 17 mils of ether, 47 mils of benzene, and in about 5 mils of glycerin at 25° C.; also in 20 mils of boiling water and in 0.6 mil of boiling alcohol.

Its saturated aqueous solution is neutral to litmus.

Acetanilid melts between 112° and 114° C.

Boil about 0.1 Gm. of Acetanilid with 5 mils of potassium hydroxide T.S., the characteristic odor of aniline becomes noticeable. Now add 1 mil of chloroform, and again heat the mixture; the disagreeable odor of phenylisocyanide (a poisonous substance) is evolved.

Boil about 0.1 Gm. of Acetanilid for several minutes with 2 mils of hydrochloric acid; a clear solution results, which, when mixed with 3 mils of an aqueous solution of phenol (1 in 20) and afterwards with 5 mils of a filtered, saturated solution of chlorinated lime, acquires a brownish-red color, which becomes deep blue upon supersaturation with ammonia water.

Bromine T.S. produces a white, crystalline precipitate in an aqueous solution of Acetanilid.

Incinerate about 2 Gm. of Acetanilid; not more than 0.05 per cent. of ash remains.

The solution of about 0.5 Gm. of Acetanilid in 5 mils of colorless sulphuric acid is not more than faintly yellow (*readily carbonizable impurities*).

Add 5 drops of ferric chloride T.S to 5 mils of a cold, saturated aqueous solution of Acetanilid; the color does not differ from that produced by adding 5 drops of ferric chloride T.S. to 5 mils of distilled water (*aniline salts or other allied substances*).

AVERAGE DOSE—Metric, 0.2 Gm.—Apothecaries, 3 grains.

ACETONUM

Acetone

Aceton.—Dimethyl-ketone

A liquid containing not less than 99 per cent. by weight of C_3H_6O or $CH_3.CO.CH_3$ (58.05). Preserve it in well-closed containers, in a cool place, remote from fire.

A transparent, colorless, mobile and volatile liquid of a characteristic ethereal odor and a pungent, sweetish taste.

Specific gravity: about 0.790 at 25° C.

Miscible without cloudiness with water, alcohol, ether, chloroform, and with most volatile oils.

It volatilizes even at low temperatures and boils between 56° and 58° C. It is inflammable and burns with a luminous, non-sooty flame.

Acetone does not affect the color of blue or red litmus paper previously moistened with water.

Evaporate 25 mils of Acetone in a platinum or porcelain dish on a water bath; not more than 0.002 Gm. of residue remains.

Mix 20 mils of Acetone in a clean, glass-stoppered bottle, with 0.1 mil of tenth-normal potassium permanganate V.S.; the pink tint so produced does not wholly disappear in less than fifteen minutes (*empyreumatic substances*).

Assay—Pour about 1 mil of Acetone into a tared weighing-bottle having a stopper, partly fill it with distilled water, and weigh accurately. Transfer the contents of the bottle, washing the bottle well with distilled water, to a 1000 mil graduated flask, fill to the mark with distilled water, and mix the contents thoroughly. Place 25 mils of normal potassium hydroxide V.S. in a 250 mil glass-stoppered flask, add exactly 25 mils of the Acetone solution (representing one-fortieth of the weight of Acetone taken), then, with constant agitation of the flask, add 35 mils of tenth-normal iodine V.S., and allow the mixture to stand for fifteen minutes. Now add 26 mils of normal hydrochloric acid V.S. and at once titrate the residual iodine with tenth-normal sodium thiosulphate V.S., with the addition of starch T.S. as indicator when the liquid is nearly decolorized. Conduct a blank test with the same quantities of the reagents and subtract the quantity of tenth-normal iodine V.S. consumed in this blank test from that consumed in the assay.

Each mil of this difference, which represents the iodine consumed by the reaction with the Acetone, corresponds to 0.0009675 Gm. of C_3H_6O. Each gramme of Acetone corresponds to not less than 1023 mils of tenth-normal iodine V.S.

ACETPHENETIDINUM

Acetphenetidin

Acetphen.—Phenacetin

The monoacetyl derivative [$C_{10}H_{13}O_2N$ or $C_6H_4(OC_2H_5).NH.CH_3CO$ 1:4=179.11] of para-amidophenetol.

Acetphenetidin occurs in white, glistening, crystalline scales or as a fine crystalline powder; odorless, having a slightly bitter taste and producing a faint numbing effect on the tongue; permanent in the air.

One Gm. of Acetphenetidin dissolves in 1310 mils of water, 15 mils of alcohol, 14 mils of chloroform, and in 90 mils of ether at 25° C.; also in 82 mils of boiling water and 2.8 mils of boiling alcohol.

Its saturated aqueous solution is neutral to litmus.

Acetphenetidin melts between 133° and 135° C.

Boil about 0.1 Gm. of Acetphenetidin for one minute with 1 mil of hydrochloric acid, dilute the mixture with 10 mils of distilled water, cool, and filter it; a drop of potassium dichromate T.S. added to the filtrate produces a ruby-red color.

Incinerate about 2 Gm. of Acetphenetidin; not more than 0.05 per cent. of ash remains.

A mixture of about 0.005 Gm. of Acetphenetidin and 1 mil of nitric acid is colored yellow, the color becoming darker on standing. The solution of about 0.5 Gm. of Acetphenetidin in 5 mils of colorless sulphuric acid is not more than faintly yellow (*readily carbonizable impurities*).

Boil about 0.1 Gm. of Acetphenetidin with 10 mils of distilled water until dissolved, cool the solution, filter it, and add bromine T.S. to the filtrate, drop by drop, with agitation after each addition, until the solution remains permanently yellow; neither turbidity nor precipitation is produced (*acetanilid*).

A mixture of about 0.3 Gm. of Acetphenetidin with 1 mil of alcohol and 1 drop of tenth-normal iodine V.S. does not acquire a red tint when diluted with three times its volume of distilled water and boiled (*para-phenetidin*).

AVERAGE DOSE—Metric, 0.3 Gm.—Apothecaries, 5 grains.

ACETUM SCILLÆ

Vinegar of Squill

Acet. Scill.

SQUILL, in No. 20 powder, *one hundred grammes*..........	100 Gm.
DILUTED ACETIC ACID, *a sufficient quantity*,	
To make *one thousand milliliters*...........	1000 mils

Macerate the squill with *nine hundred mils* of diluted acetic acid during seven days with frequent agitation; then strain the mixture, and wash the mass on the strainer with enough diluted acetic acid to make the strained liquid measure nearly *one thousand mils.* Heat this liquid to boiling, filter while hot, and when cold add sufficient diluted acetic acid to make the product measure *one thousand mils.*

Preparation—Syrupus Scillæ.

AVERAGE DOSE—Metric, 1 mil—Apothecaries, 15 minims.

ACIDUM ACETICUM

Acetic Acid

Acid. Acet.

An aqueous solution containing not less than 36 per cent. nor more than 37 per cent. of $C_2H_4O_2$ or $CH_3.COOH$ (60.03).

Acetic Acid is a clear, colorless liquid, having a strong, characteristic, vinegar-like odor, a sharply acid taste, and a strongly acid reaction.

Acetic Acid is miscible with water or alcohol.

Specific gravity: about 1.045 at 25° C.

Add sufficient ammonia water to Acetic Acid to neutralize it or to leave the Acid in slight excess, and then add ferric chloride T.S.; a blood-red color develops which is discharged by strongly acidulating the liquid with sulphuric acid.

Evaporate 20 mils of Acetic Acid to dryness on a water bath; not more than 0.002 Gm. of residue remains.

Acetic Acid diluted with 20 volumes of distilled water does not respond to the Test for heavy metals (see Part II, Test No. 3).

Separate portions of 1 mil each of Acetic Acid, diluted with 10 volumes of distilled water, show no turbidity on the addition of a few drops of barium chloride T.S. (*sulphuric acid*) nor any opalescence with a few drops of silver nitrate T.S. (*hydrochloric acid*).

Supersaturate 5 mils of the Acid with 10 mils of ammonia water, add 5 mils of tenth-normal silver nitrate V.S. and boil the solution for one or two minutes; no dark deposit is produced (*formic or sulphurous acid*).

Dilute 4 mils of the Acid, in a glass-stoppered bottle, with 20 mils of distilled water and add 0.5 mil of tenth-normal potassium permanganate V.S. The pink tint is not changed to brown at once, and does not become entirely brown or free from pinkish-brown in less than half a minute (*empyreumatic substances*).

Assay—Pour about 6 mils of Acetic Acid into a tared flask, stopper and weigh accurately, dilute with 50 mils of distilled water, and titrate with normal potassium hydroxide V.S., using phenolphthalein T.S. as indicator. It shows not less than 36 per cent. nor more than 37 per cent. of $C_2H_4O_2$.

Each mil of normal potassium hydroxide V.S. used corresponds to 0.06003 Gm. of $C_2H_4O_2$. Each gramme of Acetic Acid corresponds to not less than 6.00 mils nor more than 6.16 mils of normal potassium hydroxide V.S.

Preparation—Acidum Aceticum Dilutum.

ACIDUM ACETICUM DILUTUM

Diluted Acetic Acid

Acid. Acet. Dil.

An aqueous solution containing not less than 5.7 nor more than 6.3 per cent. of $C_2H_4O_2$ or $CH_3.COOH$ (60.03).

Acetic Acid, *one hundred and twenty grammes*	120 Gm.
Distilled Water, *six hundred and ten grammes*	610 Gm.
To make *seven hundred and thirty grammes*	730 Gm.

Mix them.

It is miscible with water or alcohol.

Specific gravity: about 1.008 at 25° C.

Diluted Acetic Acid responds to the tests for identity and purity under *Acidum Aceticum*, allowance being made for the difference in strength.

Assay—Pour about 25 mils of Diluted Acetic Acid into a tared flask, weigh accurately, and titrate with normal potassium hydroxide V.S., using phenolphthalein T.S. as indicator. It shows not less than 5.8 nor more than 6.3 per cent. of $C_2H_4O_2$.

Each mil of normal potassium hydroxide V.S. used corresponds to 0.06003 Gm. of $C_2H_4O_2$. Each gramme of Diluted Acetic Acid corresponds to not less than 0.95 mil nor more than 1.05 mils of normal potassium hydroxide V.S.

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

ACIDUM ACETICUM GLACIALE

Glacial Acetic Acid

Acid. Acet. Glac.

A liquid containing not less than 99 per cent. of $C_2H_4O_2$ or $CH_3.COOH$ (60.03). Preserve it in glass-stoppered bottles.

Glacial Acetic Acid is a clear, colorless liquid with a strong, vinegar-like odor, and a very pungent, acid taste.

It is miscible with water or alcohol.

Specific gravity: from 1.047 to 1.050 at 25° C.

It boils between 117° and 118° C.

Congealing point: not below 14.5° C.

Glacial Acetic Acid responds to the tests for identity and purity under *Acidum Aceticum* when diluted to that strength, but the tint produced by the addition of 0.1 mil of tenth-normal potassium permanganate V.S. to 2 mils of Glacial Acetic Acid, diluted with 10 mils of distilled water and contained in a glass-stoppered bottle, is not changed to brown within two hours.

Assay—Pour about 2.5 mils of Glacial Acetic Acid into a tared flask containing 10 mils of distilled water, stopper and weigh accurately, dilute with 40 mils of distilled water, and titrate this solution with normal potassium hydroxide V.S., using phenolphthalein T.S. as indicator. It shows not less than 99 per cent. of $C_2H_4O_2$.

Each mil of normal potassium hydroxide V.S. used corresponds to 0.06003 Gm. of $C_2H_4O_2$. Each gramme of Glacial Acetic Acid corresponds to not less than 16.5 mils of normal potassium hydroxide V.S.

ACIDUM BENZOICUM

Benzoic Acid

Acid. Benz.

An organic acid obtained from benzoin, or prepared synthetically. It contains, when dried to constant weight in a desiccator over sulphuric acid, not less than 99.5 per cent. of $C_7H_6O_2$ or $C_6H_5.COOH$ (122.05). Preserve it in well-closed containers, in a cool place, protected from light.

Benzoic Acid occurs in lustrous scales or friable needles. The synthetic Acid is white, odorless, or with a slight odor of benzaldehyde; the natural Acid is white or yellowish, acquires a darker color on exposure to light, and has a slight odor of benzoin. Benzoic Acid has a pungent taste, is somewhat volatile at moderately warm temperatures and freely volatile with steam.

One Gm. of Benzoic Acid dissolves in 275 mils of water, 2.3 mils of alcohol, 4.5 mils of chloroform, 3 mils of ether, in 10 mils of benzene and in 23 mils of oil of turpentine at 25° C.; also in 18 mils of boiling water, 1.5 mils of boiling alcohol, and in fixed or volatile oils.

A saturated aqueous solution of Benzoic Acid is acid to litmus.

It melts between 120° and 122° C.

Benzoic Acid is freely dissolved by solutions of the alkali hydroxides; neutralize such a solution carefully and add ferric chloride T.S., previously diluted with 2 volumes of distilled water and neutralized, if necessary, with ammonia water; a pink precipitate of ferric benzoate is produced.

Incinerate about 2 Gm. of Benzoic Acid; not more than 0.05 per cent. of ash remains.

A solution of about 0.1 Gm. of the synthetic Acid in 2 mils of sulphuric acid does not become darker than light yellow, when warmed for five minutes at 50° C. The color produced by the Acid from benzoin tested in the same manner, does not become darker than light brown (*readily carbonizable impurities*).

Mix 0.5 Gm. of the Acid and about 1 Gm. of calcium carbonate (free from chloride) with a little distilled water in a crucible, dry the mixture and incinerate it at a low red heat. Dissolve the residue in 25 mils of diluted nitric acid (free from chloride) and filter. If the synthetic Acid is being tested, the addition of 0.5 mil of silver nitrate T.S. to the filtrate does not produce a greater turbidity than is produced by the same quantity of the reagent in a mixture of 25 mils of distilled water and 0.1 mil of tenth-normal hydrochloric acid V.S. If the Acid from benzoin is being tested, the turbidity is not greater than that produced by the same quantity of reagent in a mixture of 25 mils of distilled water and 0.05 mil of tenth-normal hydrochloric acid V.S. (*chlorine*).

Warm 0.5 Gm. of the Acid with 5 mils of distilled water and 0.5 Gm. of potassium permanganate in a loosely-stoppered test tube, and place it in a water bath, heated to about 45° C., for ten minutes. Stopper the test tube tightly and allow it to cool. On removing the stopper, no odor of benzaldehyde is perceptible (*cinnamic acid*).

Assay—Dissolve about 0.5 Gm. of Benzoic Acid, previously dried to constant weight in a desiccator over sulphuric acid and accurately weighed, in 25 mils of diluted alcohol which has been previously neutralized with tenth-normal potassium hydroxide V.S., phenolphthalein T.S. being used as indicator. Titrate this solution with tenth-normal barium hydroxide V.S., using phenolphthalein T.S. as indicator. It shows, in the dried acid, not less than 99.5 per cent. of $C_7H_6O_2$.

Each mil of tenth-normal barium hydroxide V.S. used corresponds to 0.012205 Gm. of $C_7H_6O_2$. Each gramme of Benzoic Acid, previously dried, corresponds to not less than 81.5 mils of tenth-normal barium hydroxide V.S.

Preparation—Tinctura Opii Camphorata.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

ACIDUM BORICUM

Boric Acid

Acid. Bor.—Boracic Acid

It contains, when dried to constant weight in a desiccator over sulphuric acid, not less than 99.5 per cent. of H_3BO_3 (62.02).

Boric Acid occurs in transparent, colorless scales, of a somewhat pearly lustre, as six-sided, triclinic crystals, or as a white, bulky powder, slightly unctuous to the touch; odorless, having a faintly bitter taste; permanent in the air.

One Gm. of Boric Acid dissolves in 18 mils of water, 18 mils of alcohol, and in 4 mils of glycerin at 25° C.; also in 4 mils of boiling water and 6 mils of boiling alcohol.

When heated to 100° C., Boric Acid loses water, forming metaboric acid (hydrogen metaborate, HBO_2), which slowly volatilizes at that temperature.

Heated to about 160° C., Boric Acid fuses to a glassy mass of tetraboric or pyroboric acid (hydrogen tetraborate, $H_2B_4O_7$); at a higher temperature the fused mass swells, loses all of its water, and becomes boron trioxide (B_2O_3), which fuses into a transparent, non-volatile, hygroscopic mass.

Boric Acid volatilizes from a boiling aqueous or alcoholic solution.

Its solution in alcohol or glycerin, when ignited, burns with a flame enveloped by a green mantle.

An aqueous solution of Boric Acid (1 in 50) is slightly acid to litmus. Turmeric paper moistened with such a solution, to which a little hydrochloric acid T.S. has been added, becomes reddish-brown on drying, this color being changed to greenish-black by ammonia water.

One Gm. of Boric Acid dissolves completely in 10 mils of boiling alcohol.

An aqueous solution of the Acid does not respond to the Test for heavy metals (see Part II, Test No. 3).

An aqueous solution of Boric Acid meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Assay—Dissolve about 2.5 Gm. of Boric Acid, previously dried to constant weight in a desiccator over sulphuric acid and accurately weighed, in 50 mils of distilled water and 50 mils of glycerin and titrate with normal sodium hydroxide V.S., phenolphthalein T.S. being used as indicator. It shows, in the dried acid, not less than 99.5 per cent. of H_3BO_3.

Each mil of normal sodium hydroxide V.S. used corresponds to 0.06202 Gm. of H_3BO_3. Each gramme of Boric Acid, previously dried, corresponds to not less than 16.04 mils of normal sodium hydroxide V.S.

Preparations—Glyceritum Boroglycerini Unguentum Acidi Borici.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

ACIDUM CITRICUM

Citric Acid

Acid. Cit.

A tribasic organic acid usually obtained from the juice of limes or lemons. It contains not less than 99.5 per cent. of $C_6H_8O_7+H_2O$ or $C_3H_4(OH)(COOH)_3+H_2O$ (210.08). Preserve it in well-closed containers.

Citric Acid occurs in colorless, translucent, right-rhombic prisms, or as a white powder; odorless and having an acid taste; efflorescent in warm air.

One Gm. of Citric Acid dissolves in 0.5 mil of water, 1.8 mils of alcohol, and in about 30 mils of ether at 25° C.; also in 0.5 mil of boiling water.

An aqueous solution of Citric Acid (1 in 20) is acid to litmus.

Add 1 mil of an aqueous solution of the Acid (1 in 10) to 50 mils of calcium hydroxide T.S. (or sufficient of the latter to render the mixture alkaline); the liquid remains clear. When boiled for about one minute, the solution becomes opaque through the precipitation of calcium citrate.

When slowly ignited, Citric Acid is gradually decomposed without emitting an odor resembling burning sugar (difference from *tartaric acid*).

Incinerate about 2 Gm. of Citric Acid; not more than 0.05 per cent. of ash remains.

An aqueous solution of Citric Acid (1 in 10), which has been nearly neutralized with ammonia water, remains clear on the addition of calcium sulphate T.S. (*oxalic acid*).

Heat about 5 Gm. of powdered Citric Acid for fifteen minutes on a water bath with 5 mils of sulphuric acid in a porcelain dish, which has previously been rinsed with sulphuric acid, keeping the mixture protected from dust; no darker color than yellow develops (*tartaric acid*).

Ten mils of an aqueous solution of the Acid (1 in 50) mixed with 0.5 mil of hydrochloric acid does not respond to the Test for heavy metals (see Part II, Test No. 3).

The addition of 1 mil of barium chloride T.S. to 10 mils of an aqueous solution of the Acid (1 in 100), to which have previously been added a few drops of hydrochloric acid, produces no turbidity (*sulphuric acid*).

Dissolve 10 Gm. of Citric Acid in 20 mils of distilled water, add 2 mils of sulphurous acid and boil the mixture until the odor of sulphur dioxide is barely perceptible. Cool the solution, mix it with 1 mil of sodium cyanide T.S. and follow this immediately with stronger ammonia water until the solution possesses a slight odor of ammonia. When cold, transfer the solution to a glass-stoppered cylinder graduated at 50 mils, dilute it with sufficient distilled water to measure 50 mils, and add 3 drops of sodium sulphide T.S. After mixing well, the color produced in the solution, if any, when viewed downward against a white surface, is not greater than the color of a control solution prepared as follows: Dissolve 2 Gm. of ammonium chloride (see Reagents, Part II) in 20 mils of distilled water, add 4 mils of a solution containing 0.08 Gm. of lead nitrate in 1000 mils of distilled water, and then 1 mil of diluted hydrochloric acid. Treat this solution with the same quantity of sulphurous acid, sodium cyanide T.S. and stronger ammonia water, as directed above, transfer to another 50 mil glass-stoppered cylinder, then dilute it with sufficient distilled water to make 50 mils and add 3 drops of sodium sulphide T.S. (before adding the sodium sulphide T.S., the liquid must possess a distinct odor of ammonia, and the two cylinders used must be matched, be of practically colorless glass, and have the same internal diameter) (*lead*).

Assay—Dissolve about 3 Gm. of the Acid, accurately weighed, in 50 mils of distilled water and titrate the solution with normal potassium hydroxide V.S., using phenolphthalein T.S. as indicator. It shows not less than 99.5 per cent. of $C_6H_8O_7+H_2O$.

Each mil of normal potassium hydroxide V.S. used corresponds to 0.07003 Gm. of $C_6H_8O_7+H_2O$. Each gramme of Citric Acid corresponds to not less than 14.2 mils of normal potassium hydroxide V.S.

Preparation—Syrupus Acidi Citrici.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

ACIDUM GALLICUM

Gallic Acid

Acid. Gallic.

An organic acid [$C_7H_6O_5+H_2O$ or $C_6H_2(OH)_3.COOH$ 1:3:4:5+$H_2O=188.06$].

Gallic Acid occurs in white, or pale fawn-colored, silky, interlaced needles, or in triclinic prisms; odorless and having an astringent and slightly acidulous taste; permanent in the air.

One Gm. of Gallic Acid dissolves in 87 mils of water, 4.6 mils of alcohol, 10 mils of glycerin, and in about 100 mils of ether at 25° C.; also in about 3 mils of boiling water; almost insoluble in chloroform.

A saturated aqueous solution of Gallic Acid is acid to litmus.

Add 6 drops of sodium hydroxide T.S. to 5 mils of a cold, saturated aqueous solution of the Acid; a deep green color gradually develops, which is changed to reddish or brownish-red by acids.

Gallic Acid neither colors nor precipitates solutions of pure ferrous salts, but it forms a bluish-black precipitate with ferric salts.

When dried to constant weight at 100° C., the Acid loses not more than 12 per cent. of its weight.

Incinerate about 1 Gm. of Gallic Acid; not more than 0.1 per cent. of ash remains.

A cold, saturated aqueous solution of Gallic Acid yields no precipitate with gelatin T.S. or starch T.S. (*tannic acid*).

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

ACIDUM HYDRIODICUM DILUTUM

Diluted Hydriodic Acid

Acid. Hydriod. Dil.

An aqueous solution containing not less than 9.5 per cent. nor more than 10.5 per cent. of HI (127.93). Preserve it in amber-colored, glass-stoppered bottles, protected from light, and do not dispense it if it contains free iodine.

POTASSIUM IODIDE, *one hundred and thirty-five grammes*	135.0 Gm.
POTASSIUM HYPOPHOSPHITE, *ten grammes*	10.0 Gm.
TARTARIC ACID, *one hundred and thirty-six and five-tenths grammes*	136.5 Gm.
DISTILLED WATER,	
DILUTED ALCOHOL, each, *a sufficient quantity,*	
To make *one thousand grammes*	1000 Gm.

Dissolve the potassium salts in *two hundred and fifty mils* of distilled water with the aid of heat, and the tartaric acid in *four hundred mils* of diluted alcohol. Having poured the solution of tartaric acid into a bottle of about *one thousand mils* capacity, add the solution of the potassium salts and shake the mixture briskly. Cool the mixture to about 5° C. for several hours and, having inserted a pledget of purified cotton tightly in the throat of a funnel, transfer the contents of the bottle to the funnel. When all the liquid has passed through, wash the bottle and crystalline precipitate with diluted alcohol in successive small portions until the filtrate weighs *one thousand grammes.* Evaporate the liquid at a moderate temperature, on a water bath, until all of the alcohol has evaporated, and add sufficient distilled water to make the product weigh *one thousand grammes.*

Diluted Hydriodic Acid is a colorless or not more than pale yellow, odorless liquid; it has a strongly acid taste and is strongly acid to litmus.

Specific gravity: about 1.100 at 25° C.

Add a few drops of ferric chloride T.S. or chlorine water to Diluted Hydriodic Acid, diluted with twice its volume of distilled water; iodine is liberated and imparts to the solution a reddish-brown color. On agitating this mixture with a few drops of chloroform, the latter acquires a violet color.

No blue color is produced on adding a few drops of starch T.S. to 5 mils of the Acid *(free iodine).*

Five mils of Diluted Hydriodic Acid, when evaporated to dryness on a water bath and the residue ignited, leaves not more than 0.165 Gm. of residue.

The addition of 1 mil of barium chloride T.S. to 10 mils of Diluted Hydriodic Acid produces not more than a slight cloudiness (*sulphuric acid*); the addition of 1 mil of potassium sulphate T.S. to 10 mils of the Acid causes no turbidity (*barium*).

Mix 0.5 mil of Diluted Hydriodic Acid with 10 mils of distilled water, add 8 mils of silver nitrate T.S. and 6 mils of ammonium carbonate T.S., digest the mixture for ten minutes on a water bath, cool, and filter. The filtrate, upon supersaturating with nitric acid, does not become more than slightly opalescent (*chloride*).

Ten mils of Diluted Hydriodic Acid, without further acidulation, does not respond to the Test for heavy metals (see Part II, Test No. 3).

Mix 5 mils of Diluted Hydriodic Acid with 1 mil of nitric acid and evaporate the liquid to dryness on a water bath; the residue meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Assay—Pour about 5 mils of Diluted Hydriodic Acid into a tared flask, weigh accurately, dilute with 20 mils of distilled water, add 50 mils of tenth-normal silver nitrate V.S. and shake the mixture well. Now add 5 mils of nitric acid, heat the mixture on a water bath until the precipitate has a bright yellow color, cool and add 2 mils of ferric ammonium sulphate T.S. The residual titration with tenth-normal potassium sulphocyanate V.S. shows not less than 9.5 per cent. nor more than 10.5 per cent. of HI.

Each mil of tenth-normal silver nitrate V.S. used corresponds to 0.012793 Gm. of HI. Each gramme of Diluted Hydriodic Acid corresponds to not less than 7.4 mils nor more than 8.2 mils of tenth-normal silver nitrate V.S.

Preparation—Syrupus Acidi Hydriodici.

AVERAGE DOSE—Metric, 0.5 mil—Apothecaries, 8 minims.

ACIDUM HYDROBROMICUM DILUTUM

Diluted Hydrobromic Acid

Acid. Hydrobrom. Dil.

An aqueous solution containing not less than 9.5 per cent. nor more than 10.5 per cent. of HBr (80.93). Preserve it in amber-colored, glass-stoppered bottles, protected from light.

Diluted Hydrobromic Acid is a colorless, odorless liquid having a strongly acid taste; it is strongly acid to litmus.

Specific gravity: about 1.076 at 25° C.

On distilling it, weak acid passes over first; when the temperature of 126° C. is reached, an acid of 48 per cent. remains, which may be distilled unchanged.

Silver nitrate T.S. produces a yellowish-white precipitate, which is insoluble in diluted nitric acid, slowly soluble in an excess of stronger ammonia water, but readily soluble in a 10 per cent. solution of sodium thiosulphate.

Evaporate 25 mils of Diluted Hydrobromic Acid from a platinum or porcelain dish and afterwards dry it at 110° C.; not more than 0.0025 Gm. of residue remains.

The addition of 1 mil of barium chloride T.S. to 10 mils of the Acid produces not more than a slight cloudiness (*sulphuric acid*); the addition of 1 mil of potassium sulphate T.S. to 10 mils of the Acid causes no turbidity (*barium*).

Shake 10 mils of the Acid with 2 mils of chloroform; no color is imparted to the latter (*free bromine*). Now add 5 drops of ferric chloride T.S. and shake the mixture; the chloroform does not acquire a violet tint (*iodine*).

Ten mils of Diluted Hydrobromic Acid, without further acidulation, does not respond to the Test for heavy metals (see Part II, Test No. 3).

Mix 5 mils of Diluted Hydrobromic Acid with 1 mil of nitric acid and evaporate the liquid to dryness on a water bath; the residue meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Mix 0.5 mil of Diluted Hydrobromic Acid with 10 mils of distilled water, add 8 mils of silver nitrate T.S., and 6 mils of ammonium carbonate T.S., digest the mixture for ten minutes on a water bath, cool and filter. The filtrate, on supersaturating with nitric acid, does not at once become more than slightly turbid (*chloride*).

Assay—Pour about 20 mils of Diluted Hydrobromic Acid into a tared flask, weigh accurately, dilute with 30 mils of distilled water, and titrate the liquid with normal potassium hydroxide V.S., using methyl orange T.S. as indicator. It shows not less than 9.5 per cent. nor more than 10.5 per cent. of HBr.

Each mil of normal potassium hydroxide V.S. used corresponds to 0.08093 Gm. of HBr. Each gramme of Diluted Hydrobromic Acid corresponds to not less than 1.17 mils nor more than 1.30 mils of normal potassium hydroxide V.S.

AVERAGE DOSE—Metric, 1 mil—Apothecaries, 15 minims.

ACIDUM HYDROCHLORICUM

Hydrochloric Acid

Acid. Hydrochl.

An aqueous solution containing not less than 31 per cent. nor more than 33 per cent. of HCl (36.47). Preserve it in glass-stoppered bottles.

Hydrochloric Acid is a colorless, fuming liquid, having a pungent odor, and an intensely acid taste; the fumes and odor disappear on diluting the Acid with 2 volumes of water; it is strongly acid to litmus, even when highly diluted.

Specific gravity: about 1.155 at 25° C.

On distilling it at normal barometric pressure, a stronger acid passes over first, until, at 110° C., an acid of about 20 per cent. remains, which distils unchanged.

When heated with manganese dioxide, it evolves chlorine.

It conforms to the tests for identity and purity under *Acidum Hydrochloricum Dilutum* when diluted to that strength.

Assay—Pour about 3 mils of Hydrochloric Acid into a tared bottle containing about 10 mils of distilled water, stopper, weigh accurately, dilute with 50 mils of distilled water and titrate the liquid with normal potassium hydroxide V.S., using methyl orange T.S. as indicator. It shows not less than 31 per cent. nor more than 33 per cent. of HCl.

Each mil of normal potassium hydroxide V.S. used corresponds to 0.03647 Gm. of HCl. Each gramme of Hydrochloric Acid corresponds to not less than 8.50 mils nor more than 9.05 mils of normal potassium hydroxide V.S.

Preparations—Acidum Hydrochloricum Dilutum Acidum Nitrohydrochloricum Acidum Nitrohydrochloricum Dilutum.

ACIDUM HYDROCHLORICUM DILUTUM

Diluted Hydrochloric Acid

Acid. Hydrochl. Dil.

An aqueous solution containing not less than 9.5 per cent. nor more than 10.5 per cent. of HCl (36.47). Preserve it in glass-stoppered bottles.

HYDROCHLORIC ACID, *one hundred grammes*	100 Gm.
DISTILLED WATER, *two hundred and twenty grammes*	220 Gm.
To make *three hundred and twenty grammes*	320 Gm.

Mix them.

Diluted Hydrochloric Acid is a colorless, odorless liquid; it has a strongly acid taste and is strongly acid to litmus.

Specific gravity: about 1.049 at 25° C.

With silver nitrate T.S. it yields a white, curdy precipitate, insoluble in nitric acid, but readily soluble in ammonia water.

Evaporate 25 mils of Diluted Hydrochloric Acid from a platinum or porcelain dish and dry at 110° C.; not more than 0.003 Gm. of residue remains.

Add 1 mil of chloroform to 10 mils of Diluted Hydrochloric Acid and then cautiously introduce chlorine water, which has been diluted with an equal volume of distilled water, a drop at a time, with constant agitation; the chloroform remains free from any yellow, orange or violet color (*bromide or iodide*).

Add 1 mil of potassium iodide T.S. and 1 mil of chloroform to 10 mils of Diluted Hydrochloric Acid and agitate the mixture; the chloroform remains free from any violet coloration (*free chlorine or bromine*).

Two mils of Diluted Hydrochloric Acid, diluted with seven volumes of distilled water, does not respond to the Test for heavy metals (see Part II, Test No. 3).

Five mils of Diluted Hydrochloric Acid diluted with 12 mils of distilled water (without the treatment with sulphuric and sulphurous acids) meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Add 5 drops of barium chloride T.S. to a mixture of 3 mils of Diluted Hydrochloric Acid and 5 mils of distilled water; neither turbidity nor precipitation appears within one hour (*sulphuric acid or sulphates*). At the end of this period, the further addition to the liquid of 2 drops of tenth-normal iodine V.S. produces neither turbidity nor decoloration of the iodine (*sulphurous acid*).

Assay—Pour about 10 mils of Diluted Hydrochloric Acid into a tared flask, weigh accurately, dilute with 30 mils of distilled water and titrate the liquid with normal potassium hydroxide V.S., using methyl orange T.S. as indicator. It shows not less than 9.5 per cent. nor more than 10.5 per cent. of HCl.

Each mil of normal potassium hydroxide V.S. used corresponds to 0.03647 Gm. of HCl. Each gramme of Diluted Hydrochloric Acid corresponds to not less than 2.6 mils nor more than 2.9 mils of normal potassium hydroxide V.S.

AVERAGE DOSE—Metric, 1 mil—Apothecaries, 15 minims.

ACIDUM HYDROCYANICUM DILUTUM

Diluted Hydrocyanic Acid

Acid. Hydrocyan. Dil.—Diluted Prussic Acid Acidum hydrocyanicum dilutum P. I.

An aqueous solution containing not less than 1.9 per cent. nor more than 2.1 per cent. of HCN (27.02) and not more than 0.1 per cent. of HCl. Preserve it in small, dark amber-colored, well-stoppered vials.

Diluted Hydrocyanic Acid is a colorless liquid, of a characteristic odor resembling that of bitter almond; it is acid to litmus.

On account of its poisonous character *it must be handled with great caution.*

Render 1 mil of the Acid alkaline with potassium hydroxide T.S., add a few drops of ferrous sulphate T.S., boil the mixture, and then acidulate with hydrochloric acid; a blue precipitate is formed.

Not more than 0.002 Gm. of residue remains on evaporating 10 mils of Diluted Hydrocyanic Acid to dryness on a water bath.

Pour 5 mils of Diluted Hydrocyanic Acid into a tared 100 mil glass-stoppered flask containing 25 mils of distilled water, accurately determine the weight of the Acid added and then add 50 mils of tenth-normal silver nitrate V.S. and enough distilled water to make 100 mils. Agitate it well and filter through a dry filter, rejecting the first 10 mils of the filtrate. In 50 mils of the clear filtrate determine the excess of silver nitrate by titration with tenth-normal potassium sulphocyanate V.S., previously adding 2 mils of nitric acid and 2 mils of ferric ammonium sulphate T.S. From the number of mils of tenth-normal silver nitrate V.S. consumed in this assay subtract twice the number of mils of tenth-normal silver nitrate V.S. consumed in the assay of the same quantity of Diluted Hydrocyanic Acid as ascertained below. The difference when calculated to free hydrogen chloride, using the factor 0.003647, does not amount to more than one-tenth of 1 per cent. of the weight of Diluted Hydrocyanic Acid originally taken for the determination (*hydrogen chloride*).

Assay—Pour about 5 mils of Diluted Hydrocyanic Acid into a 100 mil flask containing 25 mils of distilled water and 5 mils of potassium hydroxide T.S., the whole having been previously tared, and weigh the Acid accurately. Then add 3 drops of potassium iodide T.S. and titrate with tenth-normal silver nitrate V.S. to the production of a slight, permanent precipitate. It shows not less than 1.9 per cent. nor more than 2.1 per cent. of HCN.

Each mil of tenth-normal silver nitrate V.S. used corresponds to 0.005404 Gm. of HCN. Each gramme of Diluted Hydrocyanic Acid corresponds to not less than 3.5 mils nor more than 3.9 mils of tenth-normal silver nitrate V.S.

AVERAGE DOSE—Metric, 0.1 mil—Apothecaries, 1½ minims.

ACIDUM HYPOPHOSPHOROSUM

Hypophosphorous Acid

Acid. Hypophos.

An aqueous solution containing not less than 30 per cent. nor more than 32 per cent. of HPH_2O_2 (66.06). Preserve it in glass-stoppered bottles.

Hypophosphorous Acid is a colorless or slightly yellow, odorless liquid; it has an intensely acid taste, and is acid to litmus, even when highly diluted.

Specific gravity: about 1.130 at 25° C.

When the Acid is heated in a suitable dish, water evaporates and it becomes more concentrated. On further heating between 130° and 140° C., it decomposes, forming hydrogen phosphide, which ignites, and phosphorous acid; the latter between 160° and 170° C. decomposes into hydrogen phosphide and phosphoric acid; the pasty residue finally reddens, ignites, and the last portions of unoxidized phosphorus burn out at a higher temperature.

Hypophosphorous Acid conforms to the tests for identity and purity under *Acidum Hypophosphorosum Dilutum* when diluted to that strength.

Assay—Pour about 7 mils of Hypophosphorous Acid into a tared and stoppered flask, weigh accurately, dilute with 50 mils of distilled water and titrate with normal potassium hydroxide V.S., using methyl orange T.S. as indicator. It shows not less than 30 per cent. nor more than 32 per cent. of HPH_2O_2.

Each mil of normal potassium hydroxide V.S. used corresponds to 0.06606 Gm. of HPH_2O_2. Each gramme of Hypophosphorous Acid corresponds to not less than 4.54 mils nor more than 4.84 mils of normal potassium hydroxide V.S.

Preparation—Acidum Hypophosphorosum Dilutum.

ACIDUM HYPOPHOSPHOROSUM DILUTUM

Diluted Hypophosphorous Acid

Acid. Hypophos. Dil.

An aqueous solution containing not less than 9.5 per cent. nor more than 10.5 per cent. of HPH_2O_2 (66.06). Preserve it in well-stoppered bottles.

Hypophosphorous Acid, *one hundred grammes*	100 Gm.
Distilled Water, *two hundred and ten grammes*	210 Gm.
To make *three hundred and ten grammes*	310 Gm.

Mix them.

Diluted Hypophosphorous Acid is a colorless, odorless liquid; it has a strongly acid taste and is strongly acid to litmus.

Specific gravity: about 1.042 at 25° C.

When heated in a porcelain dish, water evaporates with the evolution of hydrogen phosphide, and further decomposition takes place as described under *Acidum Hypophosphorosum*.

With silver nitrate T.S. it yields a black precipitate of silver, and with mercuric chloride T.S., a white precipitate of mercurous chloride.

Neutralize 30 mils of Diluted Hypophosphorous Acid with ammonia water; not more than a slight precipitate results, and, after filtering, a portion of the filtrate, slightly acidulated with hydrochloric acid, does not become turbid upon the addition of potassium sulphate T.S. (*barium*); another portion of the filtrate shows no turbidity with calcium chloride T.S. (*oxalic acid*).

One mil of Diluted Hypophosphorous Acid mixed with 9 mils of distilled water does not respond to the Test for heavy metals (see Part II, Test No. 3).

Mix 5 mils of Diluted Hypophosphorous Acid with 3 mils of nitric acid and 10 mils of distilled water, and evaporate the liquid to dryness on a water bath; the residue meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Assay—Pour about 25 mils of Diluted Hypophosphorous Acid into a tared flask, weigh accurately, add 25 mils of distilled water and titrate with normal potassium hydroxide V.S., using methyl orange T.S. as indicator. It shows not less than 9.5 per cent. nor more than 10.5 per cent. of HPH_2O_2.

Each mil of normal potassium hydroxide V.S. used corresponds to 0.06606 Gm. of HPH_2O_2. Each gramme of Diluted Hypophosphorous Acid corresponds to not less than 1.44 mils nor more than 1.6 mils of normal potassium hydroxide V.S.

Average dose—Metric, 0.5 mil—Apothecaries, 8 minims.

ACIDUM LACTICUM

Lactic Acid

Acid. Lact.

A liquid containing lactic acid [optically inactive alphahydroxypropionic acid, $C_3H_6O_3$ or $CH_3.CHOH.COOH = 90.05$] and lactic anhydrides, equivalent to a total of not less than 85 per cent. nor more than 90 per cent. of $C_3H_6O_3$.

Lactic Acid is a colorless, or slightly yellow, syrupy liquid, nearly odorless, having an acid taste, and absorbing moisture on exposure to air.

It is miscible with water, alcohol, or ether; insoluble in chloroform, petroleum benzin, or carbon disulphide.

Lactic Acid is strongly acid to litmus.

Specific gravity: about 1.206 at 25° C.

Lactic Acid is not vaporized at a temperature below 160° C.; at a higher temperature it emits inflammable vapors.

Add about 0.1 Gm. of potassium permanganate to 2 mils of a mixture of equal volumes of Lactic and sulphuric acids, and heat it gently; the odor of aldehyde becomes perceptible.

Not more than 0.006 Gm. of ash remains on incinerating 5 mils of Lactic Acid.

Ten mils of a solution of the Acid in distilled water (1 in 100) is not rendered opalescent by 1 mil of silver nitrate T.S. (*chloride*).

Separate portions of 10 mils each of an aqueous solution of the Acid (1 in 20) remain unaffected by the addition of 1 mil of barium chloride T.S. (*sulphate*), or by 1 mil of copper sulphate T.S. (*sarcolactic acid*).

An aqueous solution of the Acid does not respond to the Test for heavy metals (see Part II, Test No. 3).

Add a few drops of Lactic Acid to 10 mils of hot alkaline cupric tartrate V.S.; no red precipitate is produced (*sugars*).

Add 1 mil of Lactic Acid, in drops, to 5 mils of ether, shaking it after each addition; the ether solution does not become even transiently turbid (*glycerin*).

Pour Lactic Acid carefully upon an equal volume of colorless, concentrated sulphuric acid contained in a clean test tube, and keep the temperature at 15° C.; no dark colored zone develops at the line of contact upon standing for fifteen minutes (*organic impurities*).

No turbidity is produced on heating the Acid with an excess of lime water (*phosphoric, tartaric, citric, or oxalic acid*).

Assay—Pour about 2.5 mils of Lactic Acid into a tared and stoppered 250 mil flask, weigh accurately, add 50 mils of normal potassium hydroxide V.S. and boil the liquid for twenty minutes. The residual titration of the boiling solution with normal sulphuric acid V.S., using phenolphthalein T.S. as indicator, shows not less than 85 per cent. nor more than 90 per cent. of $C_3H_6O_3$.

Each mil of normal potassium hydroxide V.S. used corresponds to 0.09005 Gm. of $C_3H_6O_3$ or lactic anhydrides calculated as $C_3H_6O_3$. Each gramme of Lactic Acid corresponds to not less than 9.44 mils nor more than 10.0 mils of normal potassium hydroxide V.S.

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

ACIDUM NITRICUM

Nitric Acid

Acid. Nitric.

An aqueous solution containing not less than 67 per cent. nor more than 69 per cent. of HNO_3 (63.02). Preserve it in dark amber-colored, glass-stoppered bottles, and protect it from light.

Nitric Acid is a fuming liquid, very caustic and corrosive; it has a peculiar, somewhat suffocating odor, and is strongly acid to litmus, even when highly diluted.

Specific gravity: about 1.403 at 25° C.

It is volatilized at 110° C.

Nitric Acid dissolves copper, mercury, silver, and many other metals with the evolution of brownish-red fumes, and stains woollen fabrics and animal tissues a bright yellow.

Evaporate 20 mils of Nitric Acid from a platinum or porcelain dish and dry at 110° C.; not more than 0.003 Gm. of residue remains (*non-volatile impurities*).

Shake 2.5 mils of Nitric Acid, diluted with 7.5 mils of distilled water, with 2 mils of chloroform; the latter remains colorless (*iodine or bromine*) even after the introduction of a small piece of metallic tin (*iodic or bromic acid*).

Nitric Acid diluted with 25 volumes of distilled water and neutralized with ammonia water does not respond to the Test for heavy metals (see Part II, Test No. 3).

Evaporate 0.5 mil of Nitric Acid to dryness on a water bath; the residue meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Separate portions of Nitric Acid, diluted with 10 volumes of distilled water, do not yield a precipitate upon the addition of barium chloride T.S. (*sulphuric acid*), or of silver nitrate T.S. (*hydrochloric acid*).

Assay—Pour about 2 mils of Nitric Acid into a tared flask containing 10 mils of distilled water, stopper, weigh accurately, dilute with 50 mils of distilled water and titrate with normal potassium hydroxide V.S., using methyl orange T.S. as indicator. It shows not less than 67 per cent. nor more than 69 per cent. of HNO_3.

Each mil of normal potassium hydroxide V.S. used corresponds to 0.06302 Gm. of HNO_3. Each gramme of Nitric Acid corresponds to not less than 10.63 mils nor more than 10.95 mils of normal potassium hydroxide V.S.

Preparations—Acidum Nitrohydrochloricum Acidum Nitrohydrochloricum Dilutum.

ACIDUM NITROHYDROCHLORICUM

Nitrohydrochloric Acid

Acid. Nitrohydrochl.—Nitromuriatic Acid

A strong aqueous solution containing hydrochloric acid, nitric acid, nitrosyl chloride, and chlorine.

Nitric Acid, *eighteen milliliters*	18 mils
Hydrochloric Acid, *eighty-two milliliters*	82 mils
To make about *one hundred milliliters*	100 mils

Mix the acids in a capacious glass vessel, and, when effervescence has ceased, pour the product into dark amber-colored, glass-stoppered bottles, which must not be more than half filled, and must be kept in a cool place.

Note—Do not dispense Nitrohydrochloric Acid which does not immediately liberate iodine when one drop of the Acid is added to 1 mil of an aqueous solution of potassium iodide (1 in 5).

Nitrohydrochloric Acid is a golden-yellow, fuming, and very corrosive liquid; it has a strong odor of chlorine and is intensely acid to litmus, afterwards bleaching it. It readily dissolves gold leaf.

Not more than 0.0035 Gm. of residue remains on evaporating 10 mils of the Acid in a glass or porcelain dish and drying at 110° C.

Average dose—Metric, 0.2 mil—Apothecaries, 3 minims.

ACIDUM NITROHYDROCHLORICUM DILUTUM

Diluted Nitrohydrochloric Acid

Acid. Nitrohydrochl. Dil.—Diluted Nitromuriatic Acid

A diluted aqueous solution containing hydrochloric acid, nitric acid, nitrosyl chloride, and chlorine.

Nitric Acid, *ten milliliters*	10.0 mils
Hydrochloric Acid, *forty-five and five-tenths milliliters*	45.5 mils
Distilled Water, *one hundred and ninety-four and five-tenths milliliters*	194.5 mils
To make about *two hundred and fifty milliliters*	250 mils

Mix the acids in a capacious glass vessel, and, when effervescence has ceased, add the distilled water; pour it into dark amber-colored, glass-stoppered bottles and keep it in a cool place.

Note—Do not dispense Diluted Nitrohydrochloric Acid which does not immediately liberate iodine when five drops of the Acid are added to 1 mil of an aqueous solution of potassium iodide (1 in 5).

Diluted Nitrohydrochloric Acid is a colorless or pale yellow liquid; it has a faint odor of chlorine, a very acid taste and is strongly acid to litmus, afterwards bleaching it.

Not more than 0.0015 Gm. of residue remains on evaporating 20 mils of the Acid in a glass or porcelain dish and drying at 110° C.

Average dose—Metric, 1 mil—Apothecaries, 15 minims.

ACIDUM OLEICUM

Oleic Acid

Acid. Oleic.

An acid obtained from fats, consisting chiefly of $C_{18}H_{34}O_2$ or $C_{17}H_{33}.COOH$ (282.27). Preserve it in well-closed glass or stoneware containers, in a cool place.

Oleic Acid is a yellowish or brownish-yellow, oily liquid, having a peculiar, lard-like odor and taste free from rancidity. It becomes darker and absorbs oxygen on exposure to air.

It is practically insoluble in water; slightly soluble in 60 per cent. alcohol (by volume), the solubility very rapidly increasing in stronger alcohol; it is completely miscible with about 85 per cent. alcohol (by volume); it is also soluble in chloroform, benzene, petroleum benzin, or in fixed or volatile oils.

Specific gravity: about 0.895 at 25° C.

When gradually cooled, Oleic Acid does not become semi-solid above 9° C.; on further cooling, it congeals to a whitish, solid mass at about 4° C.

When heated to a temperature of about 95° C., decomposition commences and acrid vapors are produced.

Incinerate 5 mils of Oleic Acid; not more than 0.005 Gm. of ash remains.

Shake Oleic Acid with an equal volume of distilled water; the separated water after filtration is not reddened by the addition of a drop of methyl orange T.S. (*mineral acids*).

Boil about 1 Gm. of Oleic Acid and about 0.5 Gm. of monohydrated sodium carbonate with 30 mils of distilled water in a capacious flask; the resulting solution while hot is clear or at most opalescent (*undecomposed fat or mineral oil*).

ACIDUM PHENYLCINCHONINICUM

Phenylcinchoninic Acid

Acid. Phenylcinch.—Phenyl-quinoline-carboxylic Acid

An organic acid, 2-phenyl-quinoline-4-carboxylic acid [$C_{16}H_{11}O_2N$ or $C_6H_5.C_9H_5N.COOH = 249.10$].

Phenylcinchoninic Acid occurs in small, colorless needles or as a white or yellowish-white micro-crystalline powder; odorless or having a slight odor resembling benzoic acid, and a bitter taste. It is permanent in the air.

Insoluble in cold water; slightly soluble in cold alcohol, hot water or ether; readily soluble in hot alcohol.

It melts at about 210° C. with partial decomposition.

A saturated solution of Phenylcinchoninic Acid in hot diluted hydrochloric acid yields a precipitate of reddish-brown crystals with platinic chloride T.S.

Dissolve about 1 Gm. of Phenylcinchoninic Acid in an excess of ammonia water, evaporate the solution to dryness on a water bath, or until free from the odor of ammonia, then dilute to 20 mils with distilled water, and filter. Separate portions of this filtrate yield a white, flocculent precipitate with silver nitrate T.S.; a yellowish, flocculent precipitate with lead acetate T.S.; and a green, flocculent precipitate with copper sulphate T.S.

No weighable ash remains on incinerating about 0.5 Gm. of Phenylcinchoninic Acid.

Average dose—Metric, 0.5 Gm.—Apothecaries, 8 grains.

ACIDUM PHOSPHORICUM

Phosphoric Acid

Acid. Phos.

A liquid containing not less than 85 per cent. nor more than 88 per cent. of H_3PO_4 (98.06). Preserve it in glass-stoppered bottles.

Phosphoric Acid is a colorless, odorless liquid of a syrupy consistence; it has a strongly acid taste and is strongly acid to litmus, even when highly diluted.

Specific gravity: about 1.72 at 25° C.

When heated, the liquid loses water; at 200° C. it gradually begins to change to pyrophosphoric acid. At a still higher temperature, it is converted into metaphosphoric acid, which volatilizes in dense fumes, or which forms, on cooling, a transparent mass of glacial metaphosphoric acid.

Phosphoric Acid conforms to the tests for identity and purity given under *Acidum Phosphoricum Dilutum* when diluted to that strength.

Assay—Pour about 1 Gm. of Phosphoric Acid into a tared flask, stopper, and weigh accurately, transfer it to a 100 mil graduated flask and make it up to 100 mils with distilled water. Transfer 10 mils of this solution to a 100 mil graduated flask, add a drop of phenolphthalein T.S. and neutralize it with special potassium hydroxide T.S. (see page 545). Add 50 mils of tenth-normal silver nitrate V.S. and agitate it, gradually adding zinc oxide (see page 554) in small portions until the liquid is neutral to litmus paper. Now add distilled water to make the liquid measure 100 mils, agitate it thoroughly, filter through a dry filter, collect 50 mils of the filtrate, add 2 mils of nitric acid and 2 mils of ferric ammonium sulphate T.S. and determine the excess of silver nitrate by titration with tenth-normal potassium sulphocyanate V.S., to the production of a permanent red color. When calculated to the amount of Phosphoric Acid originally taken, it shows not less than 85 per cent. nor more than 88 per cent. of H_3PO_4.

Each mil of tenth-normal silver nitrate V.S. used corresponds to 0.0032687 Gm. of H_3PO_4. Each gramme of Phosphoric Acid corresponds to not less than 260.0 mils nor more than 269.2 mils of tenth-normal silver nitrate V.S.

Preparation—Acidum Phosphoricum Dilutum.

ACIDUM PHOSPHORICUM DILUTUM

Diluted Phosphoric Acid

Acid. Phos. Dil.

An aqueous solution containing not less than 9.5 per cent. nor more than 10.5 per cent. of H_3PO_4 (98.06). Preserve it in well-stoppered bottles.

PHOSPHORIC ACID, *one hundred grammes*	100 Gm.
DISTILLED WATER, *seven hundred and sixty-five grammes*	765 Gm.
To make *eight hundred and sixty-five grammes*	865 Gm.

Mix them.

Diluted Phosphoric Acid is a clear, colorless, odorless liquid; it has a strongly acid taste and is strongly acid to litmus.

Specific gravity: about 1.057 at 25° C.

Supersaturate 3 mils of Diluted Phosphoric Acid with ammonia water; the addition of magnesium sulphate T.S. (or of magnesia mixture T.S.) produces a white, crystalline precipitate. Collect this precipitate, wash it, and then dissolve it in diluted acetic acid; the solution yields a yellow precipitate with silver nitrate T.S. (distinction from *metaphosphoric or pyrophosphoric acid*).

Warm 5 mils of Diluted Phosphoric Acid gently and add a few drops of silver nitrate T.S.; it does not become turbid or brown (*phosphorous or hypophosphorous acid*).

Ten mils of Diluted Phosphoric Acid does not respond to the Test for heavy metals (see Part II, Test No. 3).

Two mils of Diluted Phosphoric Acid meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Diluted Phosphoric Acid is not immediately affected by silver nitrate T.S. (*hydrochloric acid*); nor is it affected, even after one hour, by the addition of an equal volume of tincture of ferric chloride (*pyrophosphoric or metaphosphoric acid*).

Evaporate 20 mils of Diluted Phosphoric Acid to a volume of about 4 mils on a water bath. Cool, transfer 2 mils to a graduated cylinder and add 6 mils of ether and 2 mils of alcohol; no turbidity appears (*phosphates*).

Mix 1 mil of Diluted Phosphoric Acid with 6 mils of distilled water, and add 1 mil of barium chloride T.S.; no immediate precipitate is produced (*sulphuric acid*).

Mix equal parts of Diluted Phosphoric Acid and sulphuric acid and, after cooling, add a clear crystal of ferrous sulphate; no brownish color appears around the crystal (*nitric acid*).

Assay—Pour about 1 mil of Diluted Phosphoric Acid into a tared flask, weigh accurately, transfer it to a 100 mil graduated flask, add a drop of phenolphthalein T.S., neutralize it with sodium hydroxide T.S. (free from chloride), then introduce 50 mils of tenth-normal silver nitrate V.S., agitate the liquid, and gradually add zinc oxide (free from chloride) in small portions until the mixture is neutral to litmus. Now add distilled water to make the product measure 100 mils, agitate it thoroughly, filter through a dry filter, collect 50 mils of the filtrate, add 2 mils of nitric acid and 2 mils of ferric ammonium sulphate T.S. and determine the excess of silver nitrate by titration with tenth-normal potassium sulphocyanate V.S. to the production of a permanent red color. When calculated to the amount of Diluted Phosphoric Acid originally taken, it shows not less than 9.5 per cent. nor more than 10.5 per cent. of H_3PO_4.

Each mil of tenth-normal silver nitrate V.S. used corresponds to 0.0032687 Gm. of H_3PO_4. Each gramme of Diluted Phosphoric Acid corresponds to not less than 29.0 mils nor more than 32.1 mils of tenth-normal silver nitrate V.S.

AVERAGE DOSE—Metric, 2 mils—Apothecaries, 30 minims.

ACIDUM SALICYLICUM

Salicylic Acid

Acid. Salicyl.

Orthohydroxybenzoic acid, existing naturally in combination in various plants, but generally prepared synthetically. It contains, when dried to constant weight in a desiccator over sulphuric acid, not less than 99.3 per cent. of $C_7H_6O_3$ or $C_6H_4(OH)COOH$ (138.05). Preserve it in well-closed containers.

Salicylic Acid occurs in fine prismatic needles, or as a bulky, crystalline powder, having a sweetish, afterwards acrid taste; permanent in the air Synthetic Salicylic Acid is white and odorless; when prepared from methyl salicylate the Acid may have a slightly yellow or pink tint and a slight, gaultheria-like odor.

One Gm. of Salicylic Acid dissolves in 460 mils of water, 2.7 mils of alcohol, 42 mils of chloroform, 3 mils of ether, 135 mils of benzene, or in 52 mils of oil of turpentine at 25° C.; also in about 15 mils of boiling water.

A saturated, aqueous solution of Salicylic Acid is acid to litmus.

It melts between 156° and 159° C.

A saturated, aqueous solution of Salicylic Acid is colored intensely bluish-violet (in high dilution violet-red) by ferric chloride T.S.

Incinerate about 1 Gm. of Salicylic Acid; not more than 0.1 per cent. of ash remains.

Allow a saturated alcoholic solution of about 1 Gm. of Salicylic Acid to evaporate spontaneously, in a glass or porcelain dish in a place protected from dust; the synthetic Acid yields a perfectly white, crystalline residue; the Acid, prepared from methyl salicylate, yields a white, or not more than a slightly yellow, or slightly pink residue (*iron, phenol, or coloring matter*).

Dissolve about 1 Gm. of Salicylic Acid in an excess of cold sodium carbonate T.S., agitate the liquid with an equal volume of ether, and allow the ethereal solution to evaporate spontaneously; the residue, if any, is free from the odor of phenol.

A solution of about 0.5 Gm. of the synthetic Salicylic Acid in 10 mils of sulphuric acid at room temperature acquires not more than a light yellow color. The Acid, prepared from methyl salicylate, under similar conditions, may produce a slightly brown color (*organic impurities*).

A solution of about 0.5 Gm. of Salicylic Acid in 10 mils of alcohol mixed with a few drops of nitric acid remains unaffected upon the addition of a few drops of silver nitrate T.S. (*hydrochloric acid*).

Assay—Dissolve about 0.5 Gm. of Salicylic Acid, previously dried to constant weight in a desiccator over sulphuric acid and accurately weighed, in 25 mils of diluted alcohol which has previously been neutralized with tenth-normal potassium hydroxide V.S., phenolphthalein T.S. being used as indicator. Titrate this solution with tenth-normal barium hydroxide V.S., using phenolphthalein T.S. as indicator. It shows, in the dried acid, not less than 99.3 per cent. of $C_7H_6O_3$.

Each mil of tenth-normal barium hydroxide V.S. corresponds to 0.013805 Gm. of $C_7H_6O_3$. Each gramme of Salicylic Acid, previously dried, corresponds to not less than 71.9 mils of tenth-normal barium hydroxide V.S.

Average dose—Metric, 0.75 Gm.—Apothecaries, 12 grains.

ACIDUM STEARICUM

Stearic Acid

Acid. Stear.

An acid obtained from tallow and other solid fats, consisting chiefly of $C_{18}H_{36}O_2$ or $C_{17}H_{35}$.COOH (284.29).

Stearic Acid is a hard, white, or yellowish-white, somewhat glossy solid, odorless, or having a slight, tallow-like odor, tasteless, and permanent in the air.

One Gm. of Stearic Acid dissolves in 21 mils of alcohol, 2 mils of chloroform, or in 3 mils of ether at 25° C.; almost insoluble in water; freely soluble in carbon disulphide or carbon tetrachloride.

Melting point: not below 56° C.

Congealing point: not below 54° C.

Incinerate about 1 Gm. of Stearic Acid; not more than 0.1 per cent. of ash remains.

Boil about 1 Gm. of Stearic Acid and about 0.5 Gm. of monohydrated sodium carbonate with 30 mils of distilled water in a capacious flask; the resulting solution while hot is not more than opalescent (*undecomposed fat or paraffin*).

Shake melted Stearic Acid with an equal volume of hot distilled water; the separated water, after filtration, is not reddened by the addition of a drop of methyl orange T.S. (*mineral acids*).

ACIDUM SULPHURICUM

Sulphuric Acid

Acid. Sulphuric.

A liquid containing not less than 93 per cent. nor more than 95 per cent. of H_2SO_4 (98.09). Preserve it in glass-stoppered bottles.

Sulphuric Acid is a colorless, odorless liquid, of oily consistence, very caustic and corrosive; it is strongly acid to litmus, even when highly diluted.

Specific gravity: about 1.83 at 25° C.

Sulphuric Acid is miscible with water or alcohol, with the evolution of much heat; the Acid must be added with great caution to the diluent.

When heated on platinum foil, it is vaporized with the evolution of dense fumes.

Sulphuric Acid chars cane sugar, wood, and many other organic substances.

Pour a layer of ferrous sulphate T.S. carefully upon 3 mils of Sulphuric Acid, contained in a test tube, and cool the liquid; the zone of contact does not assume a brown or reddish-brown color (*nitric or nitrous acid*).

No precipitate is formed within an hour on mixing Sulphuric Acid with 4 or 5 volumes of alcohol (*lead*).

Sulphuric Acid conforms to the tests for identity and purity given under *Acidum Sulphuricum Dilutum* when diluted to that strength.

Assay—Pour about 1 mil of Sulphuric Acid into a tared flask, stopper, weigh accurately, dilute with 50 mils of distilled water, cool the solution and titrate with normal potassium hydroxide V.S., using methyl orange T.S. as indicator. It shows not less than 93 per cent. nor more than 95 per cent. of H_2SO_4.

Each mil of normal potassium hydroxide V.S. used corresponds to 0.049045 Gm. of H_2SO_4. Each gramme of Sulphuric Acid corresponds to not less than 18.96 mils nor more than 19.37 mils of normal potassium hydroxide V.S.

Preparations—Acidum Sulphuricum Aromaticum Acidum Sulphuricum Dilutum.

ACIDUM SULPHURICUM AROMATICUM

Aromatic Sulphuric Acid

Acid. Sulph. Arom.

Aromatic Sulphuric Acid contains free sulphuric acid and ethylsulphuric acid together equivalent to not less than 19 per cent. nor more than 21 per cent. of H_2SO_4 (98.09). Preserve it in glass-stoppered bottles.

SULPHURIC ACID, *one hundred and nine milliliters*	109 mils
TINCTURE OF GINGER, *fifty milliliters*	50 mils
OIL OF CINNAMON, *one milliliter*	1 mil
ALCOHOL, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Add the sulphuric acid gradually, and with great caution, to *seven hundred mils* of alcohol, and allow the mixture to cool. Then add to it the tincture of ginger and the oil of cinnamon, and afterwards enough alcohol to make the product measure *one thousand mils.*

Aromatic Sulphuric Acid is a clear, reddish-brown liquid; it has a pleasant, aromatic odor and is strongly acid to litmus.

When added to barium chloride T.S. it produces a white precipitate, insoluble in hydrochloric acid.

Specific gravity: about 0.933 at 25° C.

Assay—Pour about 10 mils of Aromatic Sulphuric Acid into a tared flask, stopper, weigh accurately, transfer to a small flask, using 60 mils of distilled water to rinse the weighing-flask, and, having connected the flask with a reflux condenser, boil the liquid for six hours. When cold, dilute it with distilled water to about 100 mils and titrate with normal potassium hydroxide V.S., methyl orange T.S. being used as indicator. It shows not less than 19 per cent. nor more than 21 per cent. of H_2SO_4.

Each mil of normal potassium hydroxide V.S. used corresponds to 0.049045 Gm. of H_2SO_4. Each gramme of Aromatic Sulphuric Acid corresponds to not less than 3.87 mils nor more than 4.28 mils of normal potassium hydroxide V.S.

AVERAGE DOSE—Metric, 1 mil—Apothecaries, 15 minims.

ACIDUM SULPHURICUM DILUTUM

Diluted Sulphuric Acid

Acid. Sulph. Dil.

An aqueous solution containing not less than 9.5 per cent. nor more than 10.5 per cent. of H_2SO_4 (98.09). Preserve it in glass-stoppered bottles.

SULPHURIC ACID, *fifty grammes*	50 Gm.
DISTILLED WATER, *four hundred and twenty grammes*	420 Gm.
To make *four hundred and seventy grammes*	470 Gm.

Pour the acid gradually, with constant stirring, into the distilled water and allow it to cool.

Diluted Sulphuric Acid is a colorless, odorless liquid; it has a strongly acid taste and is strongly acid to litmus.

Specific gravity: about 1.067 at 25° C.

With barium chloride T.S. it yields a white precipitate insoluble in hydrochloric acid.

Evaporate 25 mils of Diluted Sulphuric Acid from a platinum or porcelain dish, and ignite the residue; not more than 0.0015 Gm. of residue remains after ignition (*non-volatile impurities*).

Ten mils of Diluted Sulphuric Acid does not at once discharge the color of 0.1 mil of tenth-normal potassium permanganate V.S. (*sulphurous or nitrous acid*).

Diluted Sulphuric Acid is not immediately affected by silver nitrate T.S. (*hydrochloric acid*).

Ten mils of Diluted Sulphuric Acid does not respond to the Test for heavy metals (see Part II, Test No. 3).

Two mils of Diluted Sulphuric Acid meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Assay—Pour about 20 mils of Diluted Sulphuric Acid into a tared flask, weigh accurately, dilute with 10 mils of distilled water and titrate with normal potassium hydroxide V.S., using methyl orange T.S. as indicator. It shows not less than 9.5 per cent. nor more than 10.5 per cent. of H_2SO_4.

Each mil of normal potassium hydroxide V.S. used corresponds to 0.049045 Gm. of H_2SO_4. Each gramme of Diluted Sulphuric Acid corresponds to not less than 1.94 mils nor more than 2.14 mils of normal potassium hydroxide V.S.

AVERAGE DOSE—Metric, 1 mil—Apothecaries, 15 minims.

ACIDUM TANNICUM

Tannic Acid

Acid. Tann.—Gallotannic Acid Tannin

A tannin usually obtained from nutgalls. Preserve it in well-closed containers, in a cool place, protected from light.

Tannic Acid occurs as a yellowish-white to light brown, amorphous powder, gradually turning darker when exposed to air and light, usually cohering in the form of glistening scales or spongy masses; odorless, or having a faint, characteristic odor, and a strongly astringent taste.

One Gm. of Tannic Acid dissolves in 1 mil of glycerin with the application of a moderate heat; very soluble in water and alcohol at 25° C. and in boiling water and boiling alcohol; freely soluble in diluted alcohol, slightly soluble in dehydrated alcohol and almost insoluble in ether, chloroform, benzene, or petroleum benzin.

An aqueous solution of Tannic Acid (1 in 20) is acid to litmus.

The addition of a small quantity of ferric chloride T.S. to an aqueous solution of the Acid produces a bluish-black color or precipitate.

An aqueous solution of Tannic Acid produces precipitates with nearly all alkaloids and glucosides, and with solutions of gelatin, albumin, and starch.

Tannic Acid does not lose more than 12 per cent. of its weight when dried to constant weight at 100° C.

Incinerate about 1 Gm. of Tannic Acid in a platinum dish; not more than 0.6 per cent. of ash remains.

Dissolve about 2 Gm. of Tannic Acid in 10 mils of hot distilled water; the solution is not more than slightly turbid, and no turbidity is produced on diluting 5 mils of the cooled and filtered solution with twice its volume of alcohol (*gum or dextrin*) or with twice its volume of distilled water (*resinous substances*).

Preparations—Glyceritum Acidi Tannici Trochisci Acidi Tannici Unguentum Acidi Tannici.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

ACIDUM TARTARICUM

Tartaric Acid

Acid. Tart.

A dibasic organic acid usually obtained from wine lees or argol. It contains not less than 99.5 per cent. of $C_4H_6O_6$ or $C_2H_2(OH)_2(COOH)_2$ (150.05).

Tartaric Acid occurs in colorless, translucent, monoclinic prisms, or as a white, granular or fine powder; odorless, having an acid taste; permanent in the air.

One Gm. of Tartaric Acid dissolves in 0.75 mil of water and in 3.3 mils of alcohol at 25° C.; also in 0.5 mil of boiling water; almost insoluble in chloroform, slightly soluble in ether.

An aqueous solution of Tartaric Acid (1 in 20) is acid to litmus.

An aqueous solution of the Acid (1 in 2) mixed with an equal volume of an aqueous solution of potassium acetate (1 in 3) yields a white, crystalline precipitate, which is dissolved by solutions of alkalies and by mineral acids, but is insoluble in acetic acid.

When slowly ignited it is gradually decomposed, evolving an odor resembling burning sugar.

Incinerate about 2 Gm. of Tartaric Acid; not more than 0.05 per cent. of ash remains.

The addition of 1 mil of barium chloride T.S. to 10 mils of an aqueous solution of the Acid (1 in 100), to which has previously been added a few drops of hydrochloric acid, produces no turbidity (*sulphuric acid*).

An aqueous solution of the Acid (1 in 10), in which the free acid has been nearly neutralized with ammonia water, is not affected by calcium sulphate T.S. (*oxalic acid*).

Ten mils of an aqueous solution of the Acid (1 in 50), mixed with 0.5 mil of hydrochloric acid, does not respond to the Test for heavy metals (see Part II, Test No. 3).

Dissolve 10 Gm. of Tartaric Acid in 20 mils of distilled water, add 2 mils of sulphurous acid and boil the mixture until the odor of sulphur dioxide is barely perceptible. Cool the solution, mix it with 1 mil of sodium cyanide T.S. and follow this immediately with stronger ammonia water until the precipitate formed is redissolved and the solution has a slight odor of ammonia. When cold, transfer the solution to a glass-stoppered cylinder, graduated to 50 mils. Dilute it with sufficient distilled water to measure 50 mils and add 3 drops of sodium sulphide T.S. After mixing well, the color produced in the solution, if any, when viewed downward against a white surface, is not greater than the color of a control solution prepared as follows: Dissolve 2 Gm. of ammonium chloride (see Reagents, Part II) in 20 mils of distilled water, add 4 mils of a solution containing 0.08 Gm. of lead nitrate in 1000 mils of distilled water, and then 1 mil of diluted hydrochloric acid. Treat this solution with the same quantity of sulphurous acid, sodium cyanide T.S. and stronger ammonia water, as directed above, transfer to another 50 mil glass-stoppered cylinder, then dilute it with sufficient distilled water to make 50 mils, and add 3 drops of sodium sulphide T.S. (before adding the sodium sulphide T.S., the liquid must possess a distinct odor of ammonia and the two cylinders used must be matched, be of practically colorless glass, and have the same internal diameter) (*lead*).

Assay—Dissolve about 3 Gm. of Tartaric Acid, accurately weighed, in 50 mils of distilled water and titrate this solution with normal potassium hydroxide V.S., using phenolphthalein T.S. as indicator. It shows not less than 99.5 per cent. of $C_4H_6O_6$.

Each mil of normal potassium hydroxide V.S. consumed corresponds to 0.07503 Gm. of $C_4H_6O_6$. Each gramme of Tartaric Acid corresponds to not less than 13.26 mils of normal potassium hydroxide V.S.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

ACIDUM TRICHLORACETICUM

Trichloracetic Acid

Acid. Trichloracet.

A monobasic organic acid. It contains, when dried to constant weight in a desiccator over sulphuric acid, not less than 99 per cent. of $C_2HO_2Cl_3$ or $CCl_3.COOH$ (163.39). Preserve it in well-stoppered bottles, in a cool place, protected from light.

Trichloracetic Acid occurs in colorless, deliquescent, rhombohedral crystals, having a slight, characteristic odor.

One Gm. of Trichloracetic Acid dissolves in about 0.1 mil of water at 25° C.; it is very soluble in alcohol and ether at 25° C.

An aqueous solution of Trichloracetic Acid (1 in 20) is acid to litmus.

When the Acid is heated with potassium hydroxide T.S., it is decomposed with the formation of chloroform and potassium carbonate.

Incinerate about 2 Gm. of Trichloracetic Acid; not more than 0.05 per cent. of ash remains.

Ten mils of a freshly made, aqueous solution of the Acid (1 in 20) does not immediately become more than slightly opalescent upon the addition of a few drops of silver nitrate T.S. (*chlorides*).

Dissolve a small crystal of ferrous sulphate in 5 mils of an aqueous solution of Trichloracetic Acid (1 in 20), and pour this solution upon 5 mils of sulphuric acid (free from nitrogen compounds) so as to form a layer above; no brownish-red color is produced at the zone of contact of the two liquids (*nitric acid*).

Assay—Dissolve about 4 Gm. of Trichloracetic Acid, previously dried to constant weight in a desiccator over sulphuric acid and accurately weighed in a tared and stoppered flask, in 50 mils of distilled water, add a few drops of phenolphthalein T.S. and titrate this solution with normal potassium hydroxide V.S. It shows, in the dried acid, not less than 99 per cent. of $C_2HO_2Cl_3$.

Each mil of normal potassium hydroxide V.S. corresponds to 0.16339 Gm. of $C_2HO_2Cl_3$. Each gramme of Trichloracetic Acid, previously dried, corresponds to not less than 6.06 mils nor more than 6.12 mils of normal potassium hydroxide V.S.

ACONITINA

Aconitine

Aconitin.

An alkaloid [$C_{34}H_{47}O_{11}N = 645.39$] obtained from aconite. Preserve it in well-closed containers protected from light.

Aconitine occurs in colorless or white rhombic tables or prisms, possessing no odor and permanent in the air. *The alkaloid itself must never be tasted, and its solutions only when largely diluted, and then with the utmost caution.* A drop of an aqueous solution of the alkaloid or its salts (1 in 100,000), placed upon the tongue, produces a tingling and numbing sensation.

One Gm. of Aconitine dissolves in 28 mils of alcohol, about 65 mils of ether, and in 7 mils of benzene, at 25° C.; very slightly soluble in water and almost insoluble in petroleum benzin at 25° C.

Aconitine solutions are alkaline to litmus.

When heated rapidly, Aconitine melts at about 195° C.

Stir about 0.001 Gm. of Aconitine with 2 or 3 drops of nitric or sulphuric acid on a white porcelain surface; it dissolves without coloration. With 2 drops of sulphuric acid containing 0.005 Gm. of ammonium vanadate in each mil an orange color is produced under the same conditions.

Dilute solutions of Aconitine salts yield precipitates with mercuric potassium iodide T.S., tannic acid T.S., or gold chloride T.S., but only concentrated solutions yield precipitates with platinic chloride T.S., mercuric chloride T.S., or picric acid T.S.

No weighable ash remains on incinerating 0.05 Gm. of Aconitine.

Evaporate a solution of 0.01 Gm. of Aconitine to dryness, add 5 drops of fuming nitric acid; evaporate again to dryness; the resulting yellow residue, when cooled, yields no violet color when treated with alcoholic potassium hydroxide T.S. (*pseudaconitine or atropine*).

AVERAGE DOSE—Metric, 0.00015 Gm.—Apothecaries, $^{1}/_{400}$ grain.

ACONITUM

Aconite

Aconit.—Monkshood Aconite Root Aconiti tuber P. I.

The dried tuberous roots of *Aconitum Napellus* Linné (Fam. *Ranunculaceæ*), without the presence or admixture of more than 5 per cent. of stems or other foreign matter, and yielding not less than 0.5 per cent. of the ether-soluble alkaloids of Aconite. If made into a fluidextract and assayed biologically the minimum lethal dose should not be greater than 0.00004 mil for each gramme of body weight of guinea-pig.

More or less conical or fusiform, from 4 to 10 cm. in length and from 1 to 2 cm. in diameter at the crown; externally dark brown or grayish-brown, smooth or longitudinally wrinkled, the upper end with a bud, remains of bud-scales or stem scars, the other portions with numerous root-scars or short rootlets; fracture short, horny or somewhat mealy; internally, bark light or dark brown 1 to 2 mm. in thickness, cambium zone usually 5- to 8-angled, with a small fibrovascular bundle in each angle, pith whitish or light brown, from 2 to 7 mm. in diameter; odor very slight; taste sweetish, soon becoming acrid and developing a tingling sensation, followed by numbness.

Under the microscope transverse sections, made near the middle of the tuberous root of Aconite, show an outer layer consisting of one or more rows of cells with blackish-brown walls; a primary cortex of 8 to 15 rows of parenchymatous cells and interspersed with characteristic stone cells, which occur either singly or in small groups; a more or less modified endodermis; a secondary cortex, consisting chiefly of starch-bearing parenchyma and interspersed with a few small fibrovascular bundles; a more or less star-shaped and characteristic cambium with from 5 to 12 collateral fibro-vascular bundles; and a pith composed of large, starch-bearing parenchyma cells.

The powder is grayish-brown; starch grains numerous, spherical, somewhat plano-convex, single or 2- to 5-compound, the individual grains from 0.003 to 0.015 mm. in diameter and frequently with a central cleft; tracheæ mostly with slit-like, simple pores, sometimes with spiral or reticulate thickenings or with bordered pores; stone cells single, tabular, irregular in shape or elongated to fibers, from 0.1 to 0.4 mm. in length, walls from 0.008 to 0.025 mm. in thickness, strongly lignified and having large, simple pores; fragments of cork few, yellowish-brown; fragments of parenchyma numerous, the cells being filled with starch grains; bast-fibers from stems few, very long, with lignified walls about 0.005 mm. in thickness, and marked by transverse or oblique, slit-like pores.

Aconite yields not more than 6 per cent. of ash.

Assay—Proceed as directed under *Belladonnæ Radix* (page 73), using 15 Gm. of Aconite in No. 40 powder and ether only as the immiscible solvent throughout the assay.

Each mil of tenth-normal sulphuric acid V.S. consumed corresponds to 64.539 milligrammes of the ether-soluble alkaloids of Aconite.

For an alternative method of assaying Aconite see Biological Assays (Part II).

Preparations—Extractum Aconiti Fluidextractum Aconiti Tinctura Aconiti.

AVERAGE DOSE—Metric, 0.03 Gm.—Apothecaries, $\frac{1}{2}$ grain.

ADEPS

Lard

The purified internal fat of the abdomen of the hog (*Sus scrofa*, var. *domesticus* Gray, Fam. *Suidæ*). Preserve it in a cool place in well-closed containers which are impervious to fat.

Lard is a soft, white, unctuous solid, having a faint odor and a bland taste; it is free from rancidity.

It is insoluble in water; very slightly soluble in alcohol; readily soluble in ether, chloroform, carbon disulphide, or petroleum benzin.

Lard melts between 36° and 42° C. to a clear liquid, from which no aqueous layer separates.

Distilled water boiled with Lard does not acquire an alkaline reaction (*alkalies*). Boil about 1 Gm. of Lard with 20 mils of alcohol and filter the solution after cooling; the filtrate is not rendered more than slightly turbid by the addition of a few drops of a saturated alcoholic solution of silver nitrate (*chlorides*).

Dissolve 10 Gm. of Lard in 30 mils of chloroform, mix the solution with 10 mils of neutral alcohol and add 1 drop of phenolphthalein T.S.; not more than 2 mils of tenth-normal potassium hydroxide V.S. is required to produce a pink tint after shaking it vigorously (*free fatty acids*).

Intimately mix 5 mils of melted and filtered Lard, while warm, by agitating it in a test tube with 5 mils of an alcoholic solution of silver nitrate (made by dissolving 0.1 Gm. of silver nitrate in 10 mils of alcohol, and adding 2 drops of nitric acid); heat this mixture for five minutes on a water bath. The liquid fat acquires no reddish or brown color, nor is any dark color produced at the line of contact of the hot liquids (*cottonseed fats*).

Dissolve 5 Gm. of Lard in 20 mils of ether in a test tube, stopper the tube loosely with purified cotton and allow it to stand for about twelve hours or over night at a temperature of about 20° C. Collect some of the crystals which have separated at the bottom of the test tube, mount them in either alcohol or a fixed oil and examine them under a microscope having a magnifying power of about two hundred diameters. Lard stearin crystallizes in the form of flat and rhomboidal plates, cut off obliquely at one end and grouped irregularly. Beef stearin crystallizes in the form of cylindrical rods or needles with sharp ends, grouped in fan-shaped clusters.

Saponification value: not less than 195 nor more than 203 (see Part II, Test No. 9).

Iodine value: not less than 46 nor more than 70 (see Part II, Test No. 8).

Preparation—Adeps Benzoinatus.

ADEPS BENZOINATUS

Benzoinated Lard

Adeps Benz.

LARD, *one thousand grammes*	1000 Gm.
SIAM BENZOIN, in coarse powder, *ten grammes*	10 Gm.
To make about *one thousand grammes*	1000 Gm.

Add the benzoin to the lard and mix thoroughly; then melt the mixture by means of a water bath, and, stirring frequently, continue the heat for two hours, covering the vessel and not allowing the temperature to rise above 60° C. Lastly, strain the liquid through muslin, and stir it occasionally, while it cools. Preserve it in a cool place in well-closed containers which are impervious to fat.

For use in southern latitudes and during the heated season in other localities, 50 Gm. of the lard (or more, if necessary) may be replaced by an equal weight of white wax.

ADEPS LANÆ

Wool Fat

Adeps Lan.—Anhydrous Lanolin

The purified fat of the wool of the sheep (*Ovis aries* Linné Fam. *Bovidæ*), freed from water. Preserve it in a cool place in well-closed containers which are impervious to fat.

Wool Fat is a light-yellow, tenacious, unctuous mass, having not more than a slight odor.

It is insoluble in, but miscible with, about twice its weight of water, sparingly soluble in cold alcohol, more soluble in hot alcohol, freely soluble in ether and in chloroform.

Wool Fat melts between 38° and 42° C. At higher temperatures it vaporizes, the vapor igniting and burning with a luminous, sooty flame.

A solution of Wool Fat in chloroform (1 in 50), when poured upon the surface of concentrated sulphuric acid, gradually develops a deep brownish-red color at the line of contact of the layers.

Dried to a constant weight on a water bath, with frequent stirring, Wool Fat loses not more than 0.5 per cent. of its weight (*water*).

Incinerate about 1 Gm. of Wool Fat; not more than 0.1 per cent. of ash remains. The ash, if any, is not alkaline to moistened litmus paper (*alkalies and soaps*).

Dissolve about 2 Gm. of Wool Fat in 10 mils of ether and add 2 drops of phenolphthalein T.S.; a colorless liquid is obtained (*free alkalies*) which, on the addition of 0.2 mil of tenth-normal potassium hydroxide V.S., develops a deep red color (*free fatty acids*).

Boil about 1 Gm. of Wool Fat with 20 mils of alcohol, and filter the solution after cooling; the filtrate is not rendered more than slightly turbid by the addition of a few drops of saturated alcoholic solution of silver nitrate (*chlorides*).

Melt about 10 Gm. of Wool Fat with 50 mils of distilled water on a water bath, with constant stirring; the fat separates completely on cooling, leaving the aqueous layer nearly clear and neutral to litmus. Separate portions of 10 mils each of the filtered aqueous layer leave no sweet residue on evaporation (*glycerin*), emit no ammonia vapors when boiled with 1 mil of potassium hydroxide T.S., and do not completely decolorize 0.05 mil of tenth-normal potassium permanganate V.S. within ten minutes (*soluble oxidizable impurities*).

About 0.5 Gm. of Wool Fat dissolves completely in 40 mils of boiling dehydrated alcohol (*petrolatum*).

Iodine value not less than 18 nor more than 28 (see Part II, Test No. 8).

ADEPS LANÆ HYDROSUS

Hydrous Wool Fat

Adeps Lan. Hyd.—Lanolin

The purified fat of the wool of the sheep (*Ovis aries* Linné Fam. *Bovidæ*), combined with not less than 25 nor more than 30 per cent. of water. Preserve it in a cool place in well-closed containers which are impervious to fat.

Hydrous Wool Fat is a yellowish-white, or nearly white, ointment-like mass, having not more than a slight odor.

It is insoluble in water; with ether or chloroform it yields turbid solutions which are neutral to moistened litmus paper.

Hydrous Wool Fat on heating separates into an upper oily and a lower aqueous layer. When heated on a water bath with stirring until it ceases to lose weight, there remains not less than 70 per cent. and not more than 75 per cent. of residue, which is transparent when melted, and when cold remains as a yellowish, tenacious, unctuous mass, completely soluble in ether or chloroform, and only sparingly soluble in alcohol. Hydrous Wool Fat thus deprived of water responds to the tests under *Adeps Lanæ.*

ÆTHER

Ether

A liquid containing not less than 95.5 per cent. nor more than 97.5 per cent. of ethyl oxide [$(C_2H_5)_2O = 74.08$], the remainder consisting of alcohol containing a little water. Preserve it in partially filled, well-closed containers, in a cool place, remote from fire, and protected from daylight.

When Ether is to be used for anesthesia it is to be dispensed only in small, well-closed containers and is not to be used for this purpose if the container has been opened longer than twenty-four hours.

Ether is a transparent, colorless, mobile liquid, having a characteristic odor, and a burning and sweetish taste.

It is soluble in about 12 times its volume of water at 25° C. with slight contraction of volume. Miscible with alcohol, chloroform, petroleum benzin, benzene, or fixed or volatile oils.

The color of light blue litmus paper, moistened with water, is not changed to red when the paper is immersed in Ether for ten minutes.

Specific gravity: 0.713 to 0.716 at 25° C.

Boiling point: about 35° C.

Ether is highly volatile and inflammable. Its vapor when mixed with air and ignited may explode violently. It is slowly oxidized by the action of air, moisture, and sun-light with the formation of peroxides.

The moist residue left on the spontaneous evaporation of 30 mils of Ether from a shallow dish is odorless and neither reddens nor bleaches blue litmus paper. Dried at 100° C., this residue does not exceed 0.001 Gm.

Pour 10 mils of Ether in portions upon clean, odorless blotting paper and allow it to evaporate spontaneously. No foreign odor is perceptible when the last traces of Ether leave the paper.

Shake 10 mils of Ether occasionally during one hour with 1 mil of potassium hydroxide T.S. in a glass-stoppered container, protected from light; no color is developed in either liquid (*aldehyde*).

Shake 10 mils of Ether occasionally during one hour with 1 mil of a freshly made solution of cadmium and potassium iodide (1 in 10), in a glass-stoppered cylinder previously rinsed with the Ether under examination and protected from light; no color develops in either liquid (*peroxides*).

Preparation—Spiritus Ætheris.

AVERAGE DOSE—Metric, 1 mil—Apothecaries, 15 minims.

ÆTHYLIS CARBAMAS

Ethyl Carbamate

Æthyl. Carbam.

The ethyl ester [$C_3H_7O_2N$ or $CO(OC_2H_5)NH_2 = 89.07$] of carbamic acid. Preserve it in well-closed containers.

Ethyl Carbamate occurs in colorless, columnar crystals or scales, odorless, and having a cooling, saline taste.

One Gm. of Ethyl Carbamate dissolves in 0.45 mil of water, 0.8 mil of alcohol, 2.5 mils of glycerin, 0.9 mil of chloroform, 1.5 mils of ether, and in 32 mils of olive oil, at 25° C.

Its aqueous solution (1 in 20) is neutral to litmus.

Ethyl Carbamate melts between 48° and 50° C.

Add 1 Gm. of Ethyl Carbamate to 5 mils of sulphuric acid and heat it gently; decomposition follows with the evolution of carbon dioxide (alcohol and acid ammonium sulphate remain in solution).

Heat 1 Gm. of Ethyl Carbamate with 5 mils of concentrated potassium hydroxide solution; ammonia gas is given off, recognizable by its odor.

Dissolve about 0.5 Gm. of Ethyl Carbamate in 5 mils of distilled water with about 1 Gm. of dry sodium carbonate and about 0.01 Gm. of iodine, and warm the solution; yellow crystals of iodoform separate on cooling.

Incinerate about 2 Gm. of Ethyl Carbamate; not more than 0.05 per cent. of ash remains.

Dissolve about 2 Gm. of Ethyl Carbamate in 2 mils of distilled water and add 5 mils of nitric acid to the solution; no white precipitate is produced (*urea*).

Not more than slight opalescence results from the addition of a few drops of silver nitrate T.S. to 10 mils of an aqueous solution of Ethyl Carbamate (1 in 20) (*chloride*).

Mix 2 mils of the aqueous solution (1 in 20) with 1 mil of ferrous sulphate T.S. and pour the mixture upon 2 mils of sulphuric acid, so as to form a separate layer; no red or brown zone appears (*nitrate*).

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

ÆTHYLIS CHLORIDUM

Ethyl Chloride

Æthyl. Chlor.

Monochlorethane [C_2H_5Cl or $CH_3CH_2Cl = 64.50$]. Preserve it in hermetically sealed containers, in a cool place, remote from fire, and protected from light.

When liberated at ordinary room temperature from its sealed container Ethyl Chloride vaporizes at once; *the gas is very inflammable, and must not be used in proximity to fire.*

At low temperatures or under pressure Ethyl Chloride is a colorless, mobile, very volatile liquid, having a characteristic, ethereal odor, and a burning taste.

It is slightly soluble in water, freely soluble in alcohol and in ether.

Specific gravity: about 0.921 at 0° C.

Ethyl Chloride boils between 12° and 13° C.

It burns with a smoky, greenish flame, with the production of hydrogen chloride.

Dissolve about 1 mil of Ethyl Chloride in 20 mils of alcohol, both previously cooled to the temperature of melting ice, and add a few drops of silver nitrate T.S.; no turbidity is produced at once (*hydrochloric acid*).

Shake 10 mils of Ethyl Chloride with 10 mils of distilled water, both previously cooled to the temperature of melting ice, and allow the supernatant stratum of Ethyl Chloride to evaporate spontaneously. The residual liquid is neutral to litmus, and on adding to it a few drops of potassium dichromate T.S., followed by some diluted sulphuric acid, and boiling the mixture, no odor of aldehyde is developed, and no greenish or purplish color is produced in the liquid (*alcohol*).

On the spontaneous evaporation of 5 mils of Ethyl Chloride, no foreign odor is noticeable while the last portions evaporate and no weighable residue remains.

ÆTHYLMORPHINÆ HYDROCHLORIDUM

Ethylmorphine Hydrochloride

Æthylmorph. Hydrochl.—Ethylmorphine Chloride

The hydrochloride [$C_{19}H_{23}O_3N.HCl + 2H_2O$ or $C_{17}H_{17}ON(OH)(OC_2H_5).HCl + 2H_2O = 385.69$] of an alkaloid prepared from morphine by ethylation. Preserve it in well-closed containers, protected from light.

Ethylmorphine Hydrochloride is a white or yellowish, odorless, microcrystalline powder.

One Gm. of Ethylmorphine Hydrochloride dissolves in 8 mils of water and in 22 mils of alcohol at 25° C.; slightly soluble in ether or chloroform.

An aqueous solution of the salt (1 in 20) is neutral to litmus.

It melts at about 123° C. with decomposition.

Add a drop of ferric chloride T.S. to a solution of about 0.01 Gm. of the salt in 10 mils of sulphuric acid and warm it on a water bath; the color of the mixture will become at first green, then deep violet-blue, and, after the addition of a drop of nitric acid, deep red.

Add silver nitrate T.S. to an aqueous solution of the salt (1 in 20); a white precipitate insoluble in nitric acid is produced.

No weighable ash remains on incinerating 0.2 Gm. of Ethylmorphine Hydrochloride.

Heat 5 mils of an aqueous solution of the salt (1 in 20) with 5 mils of potassium hydroxide T.S. on a water bath; no vapors showing an alkaline reaction with litmus paper are evolved at once (*ammonium compounds*)

Dissolve about 0.05 Gm. of potassium ferricyanide in 10 mils of distilled water, add a drop of ferric chloride T.S., then 1 mil of an aqueous solution of the salt (1 in 100); no green or blue color is produced at once (*morphine*).

Average dose—Metric, 0.015 Gm.—Apothecaries, ¼ grain.

AGAR

Agar

Agar-agar

The dried mucilaginous substance extracted from *Gracilaria (Sphærococcus) lichenoides* Greville and other marine algæ growing along the eastern coast of Asia, particularly several species of *Gelidium*, or *Gloiopeltis* (Class *Rhodophyceæ*).

Mostly in bundles from 4 to 6 dm. in length, consisting of thin, translucent, membranous, agglutinated pieces from 4 to 8 mm. in width; externally yellowish-white or brownish-white; tough when damp, brittle when dry; odor slight; taste mucilaginous

A fragment mounted in water and examined under the microscope gradually becomes more transparent, showing a granular structure and a few diatoms, notably the frustules of *Arachnoidiscus Ehrenbergii* Baillon, which are disk-shaped and from 0.1 to 0.2 mm. in diameter, and also fragments of the spiculæ of sponges; upon the addition of iodine some of the granules or hyphal portions are colored bluish-black.

Insoluble in cold water, but slowly soluble in hot water. A solution made by boiling 0.1 Gm. of Agar in 100 mils of water, upon cooling yields no precipitate upon the addition of tannic acid T.S. (*gelatin*), and does not produce a blue color upon the addition of iodine T.S. (*starch*).

Boil 1 part of Agar for about ten minutes with 100 parts of water, and replace the water lost by evaporation; it yields a stiff jelly upon cooling.

The powder is pale buff; when mounted in water and examined under the microscope it shows transparent, more or less granular, striated angular fragments, occasionally containing frustules of diatoms; with iodine T.S., fragments for the most part are colored bright red, certain more or less definite areas being stained bluish-black.

Agar yields not more than 5 per cent. of ash.

Average dose—Metric, 10 Gm.—Apothecaries, 2½ drachms.

ALCOHOL

Alcohol

A liquid containing not less than 92.3 per cent. by weight or 94.9 per cent. by volume, at 15.56° C., of $C_2H_5.OH$ (46.05). Preserve it in well-closed containers, in a cool place, remote from fire.

Alcohol is a transparent, colorless, mobile and volatile liquid, having a slight, characteristic odor, and a burning taste.

It is miscible with water in all proportions, and without any trace of cloudiness; also miscible with ether or chloroform.

It does not affect the color of blue or red litmus paper previously moistened with water.

Specific gravity: not above 0.816 at 15.56° C., the U.S. Government standard temperature for Alcohol, nor above 0.810 at 25° C.

Alcohol is readily volatilized, even at low temperatures, and boils at about 78° C. It is inflammable, and burns with a pale blue, smokeless flame.

Evaporate 50 mils of Alcohol in a platinum or porcelain dish on a water bath; the residue does not exceed 0.002 Gm.

Mix 10 mils of Alcohol with 5 mils of distilled water and 1 mil of glycerin and allow the mixture to evaporate spontaneously from a piece of clean, odorless blotting paper; no foreign odor is perceptible when the last traces of the Alcohol leave the paper (*fusel oil constituents*).

Allow 25 mils of alcohol to evaporate spontaneously in a porcelain evaporating dish, carefully protected from dust, until the surface of the dish is barely moist. No red or brown color is produced upon the addition of a few drops of colorless sulphuric acid (*amyl alcohol or non-volatile, carbonizable organic impurities*, etc.).

Mix 10 mils of Alcohol in a test tube with 5 mils of potassium hydroxide T.S.; the liquid does not at once assume a yellow color (*aldehyde or oak tannin*).

Shake 20 mils of Alcohol in a clean, glass-stoppered bottle with 1 mil of silver nitrate T.S.; the mixture does not become more than faintly opalescent, or acquire more than a faint brownish tint when exposed for six hours to diffused daylight (*organic impurities, amyl alcohol, aldehyde*, etc.).

Dilute the Alcohol with distilled water until it contains about 10 per cent., by volume, of ethyl alcohol. Transfer 5 mils of the dilute alcohol to a test tube, add to it 2 mils of a potassium permanganate solution (made by dissolving 3 Gm. of potassium permanganate in 100 mils of distilled water) and 0.3 mil of sulphuric acid, and allow the mixture to stand for five minutes. Now dissolve the precipitate of manganese dioxide by the addition of sulphurous acid, drop by drop with agitation, then add 1 mil of sulphuric acid and 5 mils of fuchsin-sulphurous acid T.S. and mix them. After standing for ten minutes, a colorless liquid results (*methyl alcohol*).

A mixture of 5 mils of Alcohol, 2 mils of sodium hydroxide T.S., and 5 drops of a freshly made aqueous solution of sodium nitroprusside (1 in 50), rendered slightly acid with acetic acid, shows no violet tint within one minute (*acetone*).

Preparation—Alcohol Dilutum.

ALCOHOL DEHYDRATUM

Dehydrated Alcohol

Alcohol Dehyd.—Alcohol Absolutum, U.S.P. VIII.

A liquid containing not less than 99 per cent. by weight of $C_2H_5.OH$ (46.05). Preserve it in well-closed containers, in a cool place, remote from fire.

Dehydrated Alcohol is a transparent, colorless, mobile, and volatile liquid having a characteristic odor, and a burning taste. It is very hygroscopic.

Specific gravity: not above 0.798 at 15.56° C., the U.S. Government standard temperature for alcohol, nor above 0.790 at 25° C.

Shake 10 mils of Dehydrated Alcohol in a stoppered tube with about 0.5 Gm. of powdered anhydrous copper sulphate; the latter does not become blue (*water*).

In other respects Dehydrated Alcohol has the properties and responds to the tests and reactions under *Alcohol*.

ALCOHOL DILUTUM

Diluted Alcohol

Alcohol Dil.

A liquid containing from 41 to 42 per cent. by weight or from 48.4 to 49.5 per cent. by volume, at 15.56° C., of $C_2H_5.OH$ (46.05). Preserve it in well-closed containers, in a cool place, remote from fire.

Alcohol, *five hundred milliliters*	500 mils
Distilled Water, *five hundred milliliters*	500 mils

Measure the alcohol and water at the same temperature and mix them.

If the two liquids are measured at the temperature of 25° C., the mixture, when cooled to the same temperature, will measure about 970 mils.

Diluted Alcohol may also be prepared in the following manner:

Alcohol, *four hundred and eight grammes*	408 Gm.
Distilled Water, *five hundred grammes*	500 Gm.

Mix them.

Diluted Alcohol has a specific gravity of from 0.935 to 0.937 at 15.56° C., the U. S. Government standard temperature for alcohol, and from 0.930 to 0.932 at 25° C.

It responds to the reactions and tests under *Alcohol*, allowance being made for the difference in strength and the presence of water and the boiling point being omitted.

ALOE

Aloes

The inspissated juice of the leaves of *Aloe Perryi* Baker, yielding Socotrine Aloes; or *Aloe vera* Linné, yielding Curaçao Aloes; or of *Aloe ferox* Miller, yielding Cape Aloes (Fam. *Liliaceæ*).

Socotrine Aloes—In yellowish-brown to blackish-brown opaque, or smooth and glistening masses; fractured surface somewhat conchoidal; sometimes soft or semi-liquid; odor aromatic or saffron-like, never fetid or putrid; taste nauseous, bitter.

Not less than 50 per cent. of Socotrine Aloes is soluble in cold water, the solution being of a yellowish color.

The powder is dark brown; when mounted in expressed oil of almond and examined under the microscope, it shows yellowish- to reddish-brown, irregular or angular fragments. Upon the addition of nitric acid, it yields a yellowish- to reddish-brown solution.

Curaçao Aloes—In orange to blackish-brown, opaque masses; fractured surface uneven, waxy, somewhat resinous; odor characteristic but not aromatic as in Socotrine Aloes.

Not less than 60 per cent. of Curaçao Aloes is soluble in cold water, the solution being of a purplish-red color.

The powder is deep reddish-brown; when mounted in expressed oil of almond and examined under the microscope, it shows numerous blackish-brown, irregular, more or less opaque and angular fragments. Upon the addition of nitric acid, it yields immediately a deep red liquid.

Cape Aloes—In reddish-brown or olive-black masses, usually covered with a yellowish powder, or in thin, transparent fragments of a reddish-brown color; fracture smooth and glassy; odor characteristic.

Not less than 60 per cent. of Cape Aloes is soluble in cold water, the solution being of a pale yellow color.

The powder is greenish-yellow, changing to light brown on aging; when mounted in expressed oil of almond and examined under the microscope, it shows numerous, distinctly angular, bright yellow fragments. Upon the addition of nitric acid, it yields a liquid that is colored reddish-brown, changing to purplish-brown and finally greenish.

The tests which follow apply to Socotrine, Curaçao, and Cape Aloes.

Aloes contains not more than 10 per cent. of moisture.

Add 50 mils of alcohol to 1 Gm. of Aloes, gently heat the mixture and then cool it; a nearly clear solution is obtained (*gum and inorganic impurities*).

Intimately mix 1 Gm. of Aloes with 10 mils of hot water and dilute 1 mil of this mixture with 100 mils of water; a green fluorescence is produced upon the addition of an aqueous solution of sodium borate (1 in 20). Dilute 1 mil of the original aqueous mixture of Aloes with 100 mils of water, and shake it with 10 mils of benzene; upon separating the benzene solution and adding to it 5 mils of ammonia water, a permanent deep rose color is produced in the lower layer.

Aloes yields not more than 4 per cent. of ash.

Preparations—Extractum Colocynthidis Compositum Pilulæ Aloes Pilulæ Rhei Compositæ Tinctura Aloes Tinctura Benzoini Composita.

AVERAGE DOSE—Metric, 0.25 Gm.—Apothecaries, 4 grains.

ALOINUM

Aloin

Aloin.

A pentoside or mixture of pentosides obtained from aloes, varying in chemical composition, physical and chemical properties according to the source. Preserve it in well-closed containers, protected from light.

Aloin occurs as a micro-crystalline powder or in minute acicular crystals from lemon-yellow to dark-yellow in color, odorless, or possessing a slight odor of aloes and an intensely bitter taste. It becomes darker on exposure to light and air.

Aloin varies in solubility with its composition. It is soluble in water, alcohol or acetone; slightly soluble in ether.

A saturated aqueous solution of Aloin is neutral or not more than faintly acid to litmus.

Aloin is soluble in ammonia water and alkali hydroxide solutions, forming red solutions (or yellow solutions that soon become red) which exhibit a green fluorescence.

When added to alkaline solutions, Aloin is rapidly decomposed; when mixed with acid solutions decomposition is slower. A drop of ferric chloride T.S. added to an alcoholic solution of Aloin produces a brownish-green color.

The color of a saturated aqueous solution of Aloin is yellow, but changes to brown on standing.

Incinerate about 0.5 Gm. of Aloin; not more than 0.5 per cent. of ash remains.

Shake about 1 Gm. of Aloin with 10 mils of benzene for one minute and filter;

the filtrate imparts not more than a faint, pink color to an equal volume of dilute ammonia water (5 per cent.), when shaken with it (*emodin*).

Dissolve about 1 Gm. of Aloin in 120 mils of distilled water, collect the insoluble residue, if any, on a filter tared after it has been dried at 100° C. and wash the residue with 25 mils of distilled water. This residue, when dried at 100° C., does not exceed 1.5 per cent.

AVERAGE DOSE—Metric, 0.015 Gm.—Apothecaries, ¼ grain.

ALTHÆA

Althæa

Marsh Mallow Root

The root of *Althæa officinalis* Linné (Fam. *Malvaceæ*) deprived of the brown, corky layer and small roots, and carefully dried. Preserve Althæa in tightly-closed containers, adding a few drops of chloroform or carbon tetrachloride from time to time, to prevent attack by insects.

Usually cut into small pieces about 5 mm. in diameter, of a uniform grayish-white color and otherwise having the characters of entire roots; occasionally entire, slenderly tapering, attaining a length of 30 cm. and a thickness of 2 cm.; externally whitish, longitudinally furrowed, frequently spirally twisted and covered with the somewhat loosened bast-fibers; fracture of bark fibrous, of wood short and granular; internally yellowish-white; bark 1 to 2 mm. thick, porous, due to mucilage cells, and separated from the slightly radiating wood by a distinct, grayish cambium zone; odor slight; taste sweetish, mucilaginous.

The powder is whitish; starch grains numerous, from 0.003 to 0.02 mm. in diameter, usually with a long cleft at the point of origin of growth; sclerenchymatous fibers in groups, the walls being quite thick and more or less lignified; tracheæ with scalariform thickenings or with bordered pores; calcium oxalate crystals few, in rosette aggregates from 0.02 mm. to 0.03 mm. in diameter.

Add 1 Gm. of Althæa to 10 mils of cold water, allow it to stand with occasional stirring during thirty minutes, and filter through cotton; a pale yellow-colored mucilage is obtained, which is neutral to litmus and is colored a deep yellow on the addition of a few drops of potassium hydroxide T.S. The mucilage does not have a sour or ammoniacal odor.

Althæa yields not more than 8 per cent. of ash.

ALUMEN

Alum

Alum.

It contains not less than 99.5 per cent. of $AlNH_4(SO_4)_2+12H_2O$ (453.47), or of $AlK(SO_4)_2+12H_2O$ (474.53), the label of the container must indicate whether the salt is Ammonium Alum or Potassium Alum.

Ammonium Alum and Potassium Alum both occur in large, colorless crystals, crystalline fragments, or as white powders; Alum is odorless and has a sweetish and strongly astringent taste.

Ammonium Alum—It is somewhat less soluble in water than is Potassium Alum.

Potassium hydroxide T.S. added to an aqueous solution of Ammonium Alum

(1 in 20) at first causes a precipitate, which completely dissolves in an excess of the reagent, ammonia being evolved.

Completely precipitate the aluminum from a boiling solution of 1 Gm. of Ammonium Alum in 100 mils of distilled water by the addition of a slight excess of ammonia water and filter; not more than 0.5 per cent. of residue remains on evaporating the filtrate to dryness and igniting it.

Potassium Alum—One Gm. of Potassium Alum dissolves in 7.2 mils of water at 25° C., and in 0.3 mil of boiling water; insoluble in alcohol, freely soluble in glycerin.

Potassium Alum imparts a violet color to a non-luminous flame.

The addition of sodium bitartrate T.S. to a saturated solution of Potassium Alum produces, sometimes slowly, a white crystalline precipitate.

Potassium hydroxide T.S. added to an aqueous solution of Potassium Alum (1 in 20) at first causes a precipitate, which completely dissolves in an excess of the reagent, but no ammonia is evolved.

Both Ammonium Alum and Potassium Alum conform to the following tests:

An aqueous solution of Alum (1 in 20) is acid to litmus.

When heated it fuses, and at about 200° C. it loses all of its water of crystallization. When strongly heated it loses sulphuric anhydride, becoming incompletely soluble in water.

An aqueous solution of Alum (1 in 20) yields with ammonia water a white gelatinous precipitate almost insoluble in an excess of ammonia water.

With barium chloride T.S., an aqueous solution of Alum (1 in 20) yields a white precipitate insoluble in hydrochloric acid.

An aqueous solution of Alum does not respond to the Test for heavy metals (see Part II, Test No. 3). An aqueous solution of Alum meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Add 5 drops of potassium ferrocyanide T.S. to 20 mils of an aqueous solution of Alum (1 in 150); no blue color is produced at once (*iron*).

Assay—Dissolve about 1 Gm. of the Alum, accurately weighed, and about 1 Gm. of ammonium chloride in 250 mils of distilled water and precipitate the aluminum hydroxide by the addition of a slight excess of ammonia water to the boiling solution. Collect the precipitate on a filter, wash it thoroughly with hot distilled water, dry, ignite strongly and weigh it. The aluminum oxide so obtained corresponds to not less than 99.5 per cent. of the Alum assayed.

Each Gm. of aluminum oxide corresponds to 8.874 Gm. of $AlNH_4(SO_4)_2+12H_2O$ and to 9.286 Gm. of $AlK(SO_4)_2+12H_2O$.

Preparation—Alumen Exsiccatum.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

ALUMEN EXSICCATUM

Exsiccated Alum

Alum. Exsic.—Alumen Ustum Dried Alum Burnt Alum

It contains, when recently dried to constant weight at 200° C., not less than 96.5 per cent. of anhydrous $AlNH_4(SO_4)_2$ (237.28) or of anhydrous $AlK(SO_4)_2$ (258.34), the label of the container indicating whether it is made from Ammonium Alum or from Potassium Alum. Preserve it in well-closed containers and do not dispense it if it contains more than 10 per cent. of moisture.

ALUM, in small pieces, *one hundred grammes*	100 Gm.
To make about *fifty-five grammes*	55 Gm.

Place the alum in a tared, shallow, porcelain dish so as to form a thin layer, and heat it cautiously on a sand bath until it liquefies. Then continue the application of heat, at a temperature not exceeding 200° C., with constant stirring, until aqueous vapors cease to be evolved and a dry, white, porous mass is obtained. When cold, reduce the product to a fine powder.

Exsiccated Alum is a white, granular powder, without odor, possessing a sweetish, astringent taste, and attracting moisture on exposure to the air.

One Gm. of Exsiccated Alum dissolves very slowly and usually incompletely in about 20 mils of water at 25° C.; also in 1.5 mils of boiling water; insoluble in alcohol.

Add 2 Gm. of Exsiccated Alum to 40 mils of distilled water and allow it to stand with occasional agitation for twenty-four hours. Collect the insoluble residue on previously dried and counterbalanced filters, wash with 50 mils of distilled water and finally dry at 100° C. until of constant weight; the residue weighs not more than 0.05 Gm.

Dry about 1 Gm. of Exsiccated Alum in an air bath, to constant weight at 200° C.; the loss does not exceed 10 per cent.

An aqueous solution of Exsiccated Alum responds to the reactions and tests for Ammonium Alum or for Potassium Alum given under *Alumen*, allowance being made for the difference in strength.

Assay—Dissolve about 0.5 Gm. of Exsiccated Alum, previously dried to constant weight at 200° C. and accurately weighed, in 100 mils of distilled water, filter if necessary, thoroughly wash the insoluble residue with distilled water, dilute the filtrate and washings to about 250 mils, with distilled water, and add 1 Gm. of ammonium chloride. Proceed with the assay as directed under *Alumen*, beginning with the words "and precipitate," second line of the Assay. The aluminum oxide so obtained corresponds to not less than 96.5 per cent. of the previously dried Exsiccated Alum.

Each gramme of aluminum oxide corresponds to 4.643 Gm. of $AlNH_4(SO_4)_2$, and to 5.055 Gm. of $AlK(SO_4)_2$.

ALUMINI HYDROXIDUM

Aluminum Hydroxide

Alum. Hydrox.

A compound consisting principally of aluminum hydroxide [$Al(OH)_3$ = 78.12].

ALUM, *one hundred grammes*	100 Gm.
MONOHYDRATED SODIUM CARBONATE, *forty-five grammes*	45 Gm.
Water, *a sufficient quantity.*	

Dissolve each salt separately in *one thousand mils* of water, filter the solutions and heat them to boiling. Then, having poured the hot solution of monohydrated sodium carbonate into a capacious vessel, gradually pour in the hot solution of alum with constant stirring, and afterwards add *two thousand mils* of boiling water. Allow the precipitate to subside, decant the clear liquid, and mix the precipitate with *two thousand mils* of hot water. Again decant, transfer the precipitate to a strainer, and wash it with hot water, until the washings produce not more than a faint cloudiness with barium chloride T.S. Allow the precipitate to drain, dry it at a temperature not exceeding 40° C., and reduce it to a uniformly fine powder.

Aluminum Hydroxide is a white, bulky, amorphous powder, odorless and tasteless; permanent in dry air.

It is insoluble in water and alcohol; it is dissolved by hydrochloric or sulphuric acid and by the fixed alkali hydroxides.

Solutions of Aluminum Hydroxide in hydrochloric or sulphuric acid yield with potassium hydroxide T.S. a white gelatinous precipitate, dissolved by an excess of the reagent but again precipitated by the addition of an excess of ammonium chloride.

When heated to redness it loses about 34 per cent. of its weight.

Boil 1 Gm. of Aluminum Hydroxide with 20 mils of distilled water, and filter the liquid; the filtrate does not show an alkaline reaction, and, on evaporation, does not leave a residue weighing more than 0.005 Gm. (*alkali salts*).

Heat 1 Gm. of Aluminum Hydroxide with 10 mils of hydrochloric acid, evaporate the solution to dryness, and dissolve the residue in 50 mils of distilled water. Ten mils of this solution does not respond to the Test for heavy metals (see Part II, Test No. 3).

Heat 1 Gm. of Aluminum Hydroxide with 5 mils of sulphuric acid and 5 mils of distilled water, on a water bath, for fifteen minutes. Then dilute it to 25 mils with distilled water and filter. Five mils of this filtrate meets the requirements of the Test for arsenic (see Part II, Test No. 1).

AMMONII BENZOAS

Ammonium Benzoate

Ammon. Benz.

It contains, when dried for twenty-four hours in a desiccator over sulphuric acid, not less than 98 per cent. of $NH_4C_7H_5O_2$ or $C_6H_5.COONH_4$ (139.08). Preserve it in well-closed containers in a cool place.

Ammonium Benzoate occurs in thin, white, laminar crystals or as a crystalline powder; gradually losing ammonia on exposure to air; odorless, or having a slight odor of benzoic acid, a saline, bitter, afterwards slightly acrid taste.

One Gm. of Ammonium Benzoate dissolves in about 10 mils of water, 35.5 mils of alcohol, and about 8 mils of glycerin at 25° C.

When strongly heated it evolves ammonia and benzoic acid, and is finally volatilized leaving not more than 0.05 per cent. of ash.

An aqueous solution of the salt (1 in 20) is neutral or not more than slightly acid to litmus.

An aqueous solution of Ammonium Benzoate (1 in 10) yields with ferric chloride T.S. a pink precipitate, and when such a solution is gently heated with potassium hydroxide T.S., ammonia is evolved.

Acidulate 10 mils of an aqueous solution of the salt (1 in 50) with hydrochloric acid and filter it; the filtrate does not respond to the Test for heavy metals (see Part II, Test No. 3).

Assay—Dissolve about 0.5 Gm. of Ammonium Benzoate, previously dried for twenty-four hours in a desiccator over sulphuric acid and accurately weighed, in 10 mils of distilled water in a separator. Add to the solution 5 mils of diluted sulphuric acid, and extract the liberated benzoic acid by shaking out with 3 successive portions of 25, 15 and 10 mils respectively of chloroform, passing the chloroform solution through a filter previously moistened with chloroform and removing any benzoic acid adhering to the stem of the funnel with a few mils of chloroform. Evaporate the chloroform solution at a low temperature, preferably spontaneously, to about 5 mils, add 25 mils of diluted alcohol which has been previously neutralized with tenth-normal potassium hydroxide V.S., phenolphthalein T.S. being used as indicator, and titrate this solution with tenth-normal barium hydroxide V.S., using phenolphthalein T.S. as indicator. It shows, in the dried salt, not less than 98 per cent. of $NH_4C_7H_5O_2$.

Each mil of tenth-normal barium hydroxide V.S. corresponds to 0.013908 Gm. of $NH_4C_7H_5O_2$. Each gramme of Ammonium Benzoate, previously dried, corresponds to not less than 70.5 mils of tenth-normal barium hydroxide V.S.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

AMMONII BROMIDUM

Ammonium Bromide

Ammon. Brom.

It contains, when dried to constant weight at 100° C., not less than 98.5 per cent. of NH_4Br (97.96). Preserve it in well-closed containers.

Ammonium Bromide occurs in colorless, transparent, prismatic crystals, or as a white, crystalline or granular powder; odorless, of a pungent, saline taste; somewhat hygroscopic.

One Gm. of Ammonium Bromide dissolves in 1.3 mils of water and in 12 mils of alcohol at 25° C.; also in 0.9 mil of boiling water and 1.2 mils of boiling alcohol.

When heated, Ammonium Bromide volatilizes without fusing.

An aqueous solution of the salt (1 in 20) is neutral or not more than slightly acid to litmus.

An aqueous solution of Ammonium Bromide when gently heated with potassium hydroxide T.S. evolves ammonia.

Silver nitrate T.S. added to an aqueous solution of the salt (1 in 10) produces a yellowish-white precipitate, insoluble in nitric acid or in a moderate excess of ammonia water.

Add 2 mils of nitric acid to about 2 Gm. of the salt and evaporate the mixture to dryness in a porcelain dish on a water bath and ignite the residue; it yields not more than 0.05 per cent. of non-volatile matter.

Add 1 mil of chloroform to 10 mils of an aqueous solution of the salt (1 in 20) and cautiously introduce chlorine water, which has been diluted with an equal volume of distilled water, drop by drop and with constant agitation. The liberated bromine dissolves in the chloroform and imparts to it a yellow or orange color, which is free from any violet tint (*iodide*).

Drop 1 mil of diluted sulphuric acid upon about 1 Gm. of the powdered salt; no yellow color appears at once (*bromate*).

A blue color is not produced at once on adding potassium ferrocyanide T.S. to 20 mils of an aqueous solution of the salt (1 in 250) (*iron*).

Add 1 mil of potassium sulphate T.S. to 10 mils of an aqueous solution of Ammonium Bromide (1 in 20), acidulated with acetic acid; no turbidity is produced immediately (*barium*); under similar conditions the addition of barium chloride T.S. produces no turbidity (*sulphate*).

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

Assay—Proceed as directed under the Assay for bromides (see Part II, Test No. 5), using about 0.4 Gm. of Ammonium Bromide, previously dried to constant weight at 100° C. and accurately weighed. It shows, in the dried salt, not less than 98.5 per cent. of NH_4Br.

Each mil of tenth-normal silver nitrate V.S. corresponds to 0.009796 Gm. of NH_4Br. Each gramme of Ammonium Bromide, previously dried, corresponds to not less than 100.5 mils nor more than 103.4 mils of tenth-normal silver nitrate V.S.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

AMMONII CARBONAS

Ammonium Carbonate

Ammon. Carb.

It consists of varying proportions of a mixture of acid ammonium carbonate [$NH_4HCO_3 = 79.05$] and ammonium carbamate [$NH_4NH_2CO_2 = 78.07$], and yields not less than 30 per cent. nor more than 32 per cent. of NH_3. Preserve it in well-closed containers in a cool place. For medicinal purposes, use only the translucent portions.

Ammonium Carbonate occurs in white, hard, translucent, striated masses, having a strong odor of ammonia, without empyreuma, and a sharp, ammoniacal taste. On exposure to the air, the salt loses both ammonia and carbon dioxide, becoming opaque, and is finally converted into friable, porous lumps, or a white powder.

When heated, Ammonium Carbonate is volatilized, without charring, the vapor showing a strongly alkaline reaction with litmus; not more than 0.05 per cent. of residue remains.

One Gm. of Ammonium Carbonate dissolves very slowly in 4 mils of water at 25° C.; it is decomposed by hot water, with the elimination of carbon dioxide and ammonia. By prolonged boiling with water the salt is completely volatilized. Alcohol dissolves the carbamate leaving the acid carbonate.

An aqueous solution of the salt (1 in 20) effervesces with acids, and is alkaline to litmus.

An aqueous solution of the salt (1 in 50), when slightly supersaturated with hydrochloric acid, does not respond to the Test for heavy metals (see Part II, Test No. 3). Five mils of a similar solution is not immediately affected by barium chloride T.S. (*sulphate*).

Ten mils of an aqueous solution of the salt (1 in 20), on the addition of a slight excess of silver nitrate T.S., and subsequent supersaturation with nitric acid, neither assumes a brown color (*thiosulphate*), nor becomes more than slightly opalescent within two minutes (*chloride*).

On slightly supersaturating an aqueous solution, containing 1 Gm. of the salt, with nitric acid, and then evaporating it to dryness on a water bath, a colorless and odorless residue is obtained (*empyreumatic matter*).

Assay—Introduce about 2 Gm. of unaltered, translucent Ammonium Carbonate into a tared weighing-bottle containing 10 mils of distilled water, stopper, weigh accurately and add 40 mils of distilled water and 50 mils of normal sulphuric acid V.S. and when solution is effected titrate the excess of acid with normal potassium hydroxide V.S., using methyl orange T.S. as indicator. It shows not less than 30 per cent. nor more than 32 per cent. of NH_3.

Each mil of normal sulphuric acid V.S. used corresponds to 0.01703 Gm. of NH_3. Each gramme of Ammonium Carbonate corresponds to not less than 17.6 mils nor more than 18.8 mils of normal sulphuric acid V.S.

Preparation—Spiritus Ammonii Aromaticus.

Average dose—Metric, 0.3 Gm.—Apothecaries, 5 grains.

AMMONII CHLORIDUM

Ammonium Chloride

Ammon. Chlor.

It contains, when dried to constant weight at 100° C., not less than 99.5 per cent. of NH_4Cl (53.50).

Ammonium Chloride is a white, crystalline or granular powder, without odor, having a cooling and saline taste; somewhat hygroscopic.

One Gm. of Ammonium Chloride dissolves in 2.6 mils of water, 100 mils of alcohol and in 8 mils of glycerin at 25° C.; also in 1.4 mils of boiling water.

Ammonium Chloride, on ignition, is volatilized without fusing.

An aqueous solution of the salt (1 in 20) in ice-cold water does not show an immediate acid reaction with litmus.

Silver nitrate T.S. added to an aqueous solution of the salt (1 in 10) produces a white, curdy precipitate, insoluble in nitric acid but readily soluble in ammonia water.

An aqueous solution of the salt, when heated with potassium hydroxide T.S., evolves ammonia.

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

When acidulated with hydrochloric acid, 10 mils of an aqueous solution of the salt (1 in 10) does not assume a red color on the addition of a few drops of ferric chloride T.S. (*sulphocyanate*).

Add 2 mils of nitric acid to 2 Gm. of the salt and evaporate the mixture to dryness in a porcelain dish on a water bath; a white residue is obtained, which, when ignited, yields not more than 0.05 per cent. of non-volatile substances.

Assay—Proceed as directed under the Assay for chlorides (see Part II, Test No. 5), using about 0.2 Gm. of Ammonium Chloride, previously dried to constant weight at 100° C. and accurately weighed. It shows, in the dried salt, not less than 99.5 per cent. of NH_4Cl.

Each mil of tenth-normal silver nitrate V.S. corresponds to 0.005350 Gm. of NH_4Cl. Each gramme of Ammonium Chloride, previously dried, corresponds to not less than 186.0 mils of tenth-normal silver nitrate V.S.

Preparation—Trochisci Ammonii Chloridi.

AVERAGE DOSE—Metric, 0.3 Gm.—Apothecaries, 5 grains.

AMMONII IODIDUM

Ammonium Iodide

Ammon. Iod.

It contains, when dried to constant weight at 100° C., not less than 99 per cent. of NH_4I (144.96). Preserve it in small, well-closed containers, protected from light.

Ammonium Iodide occurs in minute, colorless, cubical crystals, or as a white, granular powder, odorless and having a sharp, saline taste. The salt is very hygroscopic, and soon becomes yellow or yellowish-brown on exposure to air and light, owing to the loss of ammonia and the liberation of iodine.

One Gm. of Ammonium Iodide dissolves in 0.6 mil of water, 3.7 mils of alcohol and in 1.5 mils of glycerin at 25° C.; also in 0.5 mil of boiling water.

When strongly heated, Ammonium Iodide evolves vapor of iodine, and volatilizes without fusing, leaving not more than 0.1 per cent. of residue.

An aqueous solution of the salt (1 in 20) is neutral or not more than slightly acid to litmus. When heated with potassium hydroxide T.S., ammonia is liberated.

Add a few drops of ferric chloride T.S. to 5 mils of an aqueous solution of the salt (1 in 20); iodine is liberated which imparts a violet color to chloroform when shaken with the solution.

Ten mils of an aqueous solution of Ammonium Iodide (1 in 20), when acidulated with hydrochloric acid, is not rendered turbid by the addition of 1 mil of potassium sulphate T.S. (*barium*).

Ten mils of an aqueous solution of the salt (1 in 150) does not at once assume a blue color upon the addition of 3 drops of potassium ferrocyanide T.S. (*iron*).

Shake 5 mils of an aqueous solution of the salt (1 in 150) with 1 mil of chloroform; no violet color is imparted to the latter (*free iodine*).

An aqueous solution of Ammonium Iodide does not respond to the Test for heavy metals (see Part II, Test No. 3).

Assay—Proceed as directed under the Assay for iodides (see Part II, Test No. 5), using about 0.5 Gm. of Ammonium Iodide, previously dried to constant weight at 100° C. and accurately weighed in a stoppered weighing-bottle. It shows, in the dried salt, not less than 99 per cent. of NH_4I.

Each mil of tenth-normal silver nitrate V.S. corresponds to 0.014496 Gm. of NH_4I. Each gramme of Ammonium Iodide, previously dried, corresponds to not less than 68.3 mils nor more than 70.1 mils of tenth-normal silver nitrate V.S.

AVERAGE DOSE—Metric, 0.3 Gm.—Apothecaries, 5 grains.

AMMONII SALICYLAS

Ammonium Salicylate

Ammon. Salicyl.

It contains, when dried for twenty-four hours in a desiccator over sulphuric acid, not less than 98 per cent. of $NH_4C_7H_5O_3$ or $C_6H_4(OH)COONH_4$ (155.08). Preserve it in well-closed containers, protected from heat and light.

Ammonium Salicylate occurs in colorless, lustrous, monoclinic prisms, or plates, or as a white, crystalline powder; odorless, and having at first a slightly saline, bitter taste, with a sweetish after-taste. Permanent in dry air.

One Gm. of Ammonium Salicylate dissolves in 1 mil of water and in 3 mils of alcohol at 25° C.

When heated, the salt fuses with decomposition, giving off inflammable vapors and an odor of phenol, and is finally volatilized, leaving not more than 0.1 per cent. of ash.

An aqueous solution of the salt (1 in 10) is colorless and neutral or slightly acid to litmus. When heated with potassium hydroxide T.S. ammonia is evolved.

Add a few drops of ferric chloride T.S. to an excess of a concentrated aqueous solution of Ammonium Salicylate (1 in 4); a dark red color and a precipitate are produced. In dilute solution (1 in 100) a deep violet-blue color appears.

Diluted hydrochloric or sulphuric acid produces, in a concentrated aqueous solution of the salt, a voluminous, white precipitate.

Acidulate 10 mils of an aqueous solution of Ammonium Salicylate (1 in 50) with hydrochloric acid and filter; the filtrate does not respond to the Test for heavy metals (see Part II, Test No. 3).

Assay—Dissolve about 0.5 Gm. of Ammonium Salicylate, previously dried for twenty-four hours in a desiccator over sulphuric acid and accurately weighed, in 10 mils of distilled water in a separator. Add to the solution 5 mils of diluted sulphuric acid, and extract the liberated salicylic acid by shaking out with three successive portions of 25, 15 and 10 mils respectively of chloroform, passing the chloroform solution through a filter previously moistened with chloroform and removing any salicylic acid adhering to the stem of the funnel with a few mils of chloroform. Evaporate the chloroform to about 5 mils, add 25 mils of diluted alcohol which has been previously neutralized with tenth-normal potassium hydroxide V.S., phenolphthalein T.S. being used as indicator, and titrate this solution with tenth-normal barium hydroxide V.S., using phenolphthalein T.S. as indicator. It shows, in the dried salt, not less than 98 per cent. of $NH_4C_7H_5O_3$.

Each mil of tenth-normal barium hydroxide V.S. corresponds to 0.015508 Gm. of $NH_4C_7H_5O_3$. Each gramme of Ammonium Salicylate, previously dried, corresponds to not less than 63.2 mils of tenth-normal barium hydroxide V.S.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

AMMONII VALERAS

Ammonium Valerate

Ammon. Valer.—Ammonium Valerianate

A compound of ammonia and valeric acid having a somewhat varying composition. Preserve it in well-closed containers.

Ammonium Valerate occurs in colorless, or white, quadrangular plates, emitting the odor of valeric acid; it is deliquescent in moist air, and has a sharp and sweetish taste.

One Gm. of Ammonium Valerate dissolves in 0.3 mil of water and in 0.6 mil of alcohol at 25° C.; soluble in ether.

When heated, the salt fuses, gives off vapors of ammonia and valeric acid, and is finally volatilized, leaving not more than 0.05 per cent. of residue.

An aqueous solution of the salt (1 in 20) is acid to litmus, and when heated with potassium hydroxide T.S. evolves ammonia.

Supersaturate slightly a concentrated aqueous solution of Ammonium Valerate with sulphuric acid; an oily layer of valeric acid rises to the surface.

Precipitate completely 10 mils of an aqueous solution of the salt (1 in 20) with ferric chloride T.S.; the filtrate does not possess a deep red color (*acetate*).

An aqueous solution of the salt (1 in 50), when slightly acidulated with hydrochloric acid and filtered through a small, wetted filter, does not respond to the Test for heavy metals (see Part II, Test No. 3).

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

AMYGDALA DULCIS

Sweet Almond

Amygd. Dulc.

The ripe seeds of *Prunus Amygdalus dulcis* De Candolle (Fam. *Rosaceæ*). Preserve Sweet Almond in tightly-closed containers, adding a few drops of chloroform or carbon tetrachloride from time to time to prevent attack by insects.

Ovate or oblong lanceolate, 17 to 25 mm. in length, 10 to 13 mm. in breadth and 4 to 7 mm. in thickness; seed-coat light brown with numerous parallel veins, thin and easily removed on soaking the seed in water; embryo straight, white, and with two plano-convex cotyledons; taste bland, sweet.

Triturate Sweet Almond with water; a milk-white emulsion is produced which is not acid to litmus, and has no odor of benzaldehyde or hydrocyanic acid (*bitter almond*).

The powder is creamy-white, exhibiting numerous very small oil globules, 0.001 mm. or less in diameter, and larger oil globules and crystalloids, the latter sometimes with adhering globoids; fragments of parenchyma of endosperm, containing oil globules and aleurone grains; also occasional fragments of seed-coat with characteristic, more or less scattered, large, elliptical, thin-walled, strongly lignified epidermal cells and narrow, closely spiral tracheæ. Starch grains are absent.

Sweet Almond yields not more than 4 per cent. of ash.

Preparation—Emulsum Amygdalæ.

AMYLIS NITRIS

Amyl Nitrite

Amyl. Nitris

A liquid containing not less than 80 per cent. of $C_5H_{11}NO_2$ (117.10) (chiefly iso-amyl nitrite). Preserve it in hermetically sealed glass bulbs, or in glass-stoppered vials, in a cool place, protected from light.

Amyl Nitrite is a clear, yellowish liquid, of a peculiar, ethereal, fruity odor and a pungent, aromatic taste.

It is almost insoluble in water, miscible with alcohol or ether.

Specific gravity: 0.865 to 0.875 at 25° C.

Amyl Nitrite is very volatile, even at a low temperature, and is inflammable, burning with a yellow, luminous and sooty flame.

Add 2 mils of sulphuric acid to a mixture of 2 drops of Amyl Nitrite and 2 drops of water; amyl valerate is produced, recognizable by its odor on dilution with water.

Add a few drops of Amyl Nitrite to a mixture of 1 mil of ferrous sulphate T.S. and 5 mils of diluted hydrochloric acid; a greenish-brown color is produced.

Mix 1 mil of normal potassium hydroxide V.S. and 10 mils of distilled water in a test tube with a drop of phenolphthalein T.S. and add 5 mils of Amyl Nitrite; after inverting the tube a few times, the red tint of the aqueous layer is still perceptible (*free acid*).

A mixture of 1.5 mils of silver nitrate T.S. and 1.5 mils of alcohol with a few drops of ammonia water does not become brown or black on adding 1 mil of Amyl Nitrite and gently heating the mixture (*aldehyde*).

Assay—Transfer about 3 mils of Amyl Nitrite, which has been previously shaken with 0.5 Gm. of potassium bicarbonate and carefully decanted, to a tared 100 mil measuring-flask, containing about 20 mils of alcohol, and weigh it accurately. Add sufficient alcohol to bring the volume to exactly 100 mils and mix thoroughly. Introduce into a nitrometer (see Part II, Test No. 19) exactly 10 mils of the alcoholic solution, followed by 10 mils of potassium iodide T.S., and afterwards by 5 mils of diluted sulphuric acid. When the volume of gas has become constant (within thirty to sixty minutes), note the amount collected, multiply this volume in mils by 4.8 and divide the product by the original weight in grammes of the Amyl Nitrite. At standard temperature and pressure, the quotient represents the percentage of Amyl Nitrite in the liquid. The temperature correction is one-third of one per cent. of the total percentage just found for each degree,—additive if the temperature is below

25° C., and subtractive if it is above 25° C. The barometric correction is four-thirtieths of one per cent. of the total percentage just found for each millimeter, —additive if it is above 760 mm., and subtractive if it is below 760 mm.

Average dose—By inhalation, Metric, 0.2 mil—Apothecaries, 3 minims.

AMYLUM

Starch

Amyl.—Corn Starch

The starch separated from the grain of *Zea Mays* Linné (Fam. *Gramineæ*).

In fine powder, or irregular, angular, white masses; consisting chiefly of polygonal, rounded or spheroidal starch grains from 0.003 to 0.035 mm. in diameter, usually with a lenticular or 3- to 4-rayed central cleft, or in the rounded grains, with a circular marking; inodorous; taste slight, characteristic.

The individual starch grains are colored a deep blue by iodine T.S. Corn starch is insoluble in cold water and in alcohol; upon boiling 1 Gm. of Starch with 15 mils of water and cooling, it yields a translucent, whitish jelly.

Incinerate about 0.5 Gm. of Starch; not more than 0.5 per cent. of ash remains.

Triturate about 0.5 Gm. of Starch with 5 mils of distilled water; the mixture is neutral to litmus.

Preparation—Glyceritum Amyli.

ANISUM

Anise

Anis.—Aniseed

The dried ripe fruit of *Pimpinella Anisum* Linné (Fam. *Umbelliferæ*) without the presence or admixture of more than 3 per cent. of foreign seeds or other vegetable matter.

Cremocarp broadly ovoid or pyriform, laterally compressed, from 3 to 6 mm. in length and from 2 to 3 mm. in breadth; mericarps usually cohering and attached to a slender pedicel from 2 to 12 mm. in length; summit with a ring-like disk and 2 projecting, diverging styles; externally grayish or greenish-gray, seldom grayish-brown, slightly pubescent; each with five light brown filiform ridges and in cross-section with from 15 to 45 vittæ. Odor and taste agreeable and aromatic.

Under the microscope transverse sections of Anise show an epidermal layer with numerous papillæ and short, one-celled, non-glandular hairs having very thick papillose walls; primary ribs each with a small fibro-vascular bundle, surrounded by a few sclerenchymatous fibers; vittæ or oil-tubes from 15 to 45 in number, extending as a more or less interrupted circle in the tissues of the mesocarp on the dorsal side of each mericarp; 2 large vittæ on the commissural surface, each separated from the other tissues of the mericarp by a large cavity due to shrinkage of the seed-coat, inner epidermis of pericarp consisting of a layer of narrow, tangentially elongated cells closely united with the 1-layered seed-coat, the inner walls of which are yellowish-brown and considerably thickened; endosperm of polygonal, thick-walled cells filled with spherical or ellipsoidal aleurone grains, each containing a small rosette aggregate of calcium oxalate; the aleurone grains surrounded with an oily protoplasm, the oil of which is liberated upon mounting sections in hydrated chloral T.S., in the form of small globules; epidermal layer near the middle of the commissural surface composed of 2 or 3 rows of cells with thick porous walls, and beneath which occur small groups of thick-walled cells resembling stone cells.

The powder is yellowish-brown; consisting of numerous irregular fragments of pericarp showing portions of the yellowish vittæ, fragments with tracheæ and sclerenchymatous fibers of carpophore; cells of endosperm filled with aleurone grains about 0.006 mm. in diameter, each usually enclosing a rosette aggregate crystal of calcium oxalate about 0.002 mm. in diameter; non-glandular hairs 1-celled, from 0.025 to 0.2 mm. in length, either straight or curved and with numerous, slight, centrifugal projections on the outer surface.

Heat 1 Gm. of the whole drug or powdered drug with 10 mils of potassium hydroxide T.S.; no mouse-like odor develops (fruits of *Conium maculatum* Linné).

Anise yields not more than 9 per cent. of ash.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

ANTIMONII ET POTASSII TARTRAS

Antimony and Potassium Tartrate

Antim. et Pot. Tart.—Antimonyl Potassium Tartrate Tartrated Antimony Tartar Emetic

It contains not less than 98.5 per cent. of $K(SbO)C_4H_4O_6+\frac{1}{2}H_2O$ (332.34). Preserve it in well-closed containers.

Antimony and Potassium Tartrate occurs as colorless, transparent crystals of the rhombic system, or as a white granular powder; without odor, and having a sweet, afterwards disagreeable, metallic taste. The crystals effloresce upon exposure to the air.

One Gm. of Antimony and Potassium Tartrate dissolves in 12 mils of water and in 15 mils of glycerin at 25° C.; also in 3 mils of boiling water; insoluble in alcohol.

Its aqueous solution (1 in 20) is slightly acid to litmus.

When heated to redness it chars, emits an odor resembling that of burning sugar, and leaves a blackened residue having an alkaline reaction and imparting a violet color when a small fragment is held in a non-luminous flame.

In an aqueous solution of Antimony and Potassium Tartrate (1 in 20), acidulated with hydrochloric acid, hydrogen sulphide T.S. produces an orange-red precipitate, which is soluble in ammonium sulphide T.S. or potassium hydroxide T.S.

Ten mils of an aqueous solution of the salt (1 in 100), acidulated with acetic acid, does not at once assume a blue color on the addition of 5 drops of potassium ferrocyanide T.S. (*iron*).

Dissolve 0.2 Gm. of Antimony and Potassium Tartrate in 5 mils of hydrochloric acid; the solution does not respond to Bettendorf's Test for arsenic (see Part II, Test No. 2).

Assay—Dissolve about 0.5 Gm. of Antimony and Potassium Tartrate, accurately weighed, in 30 mils of distilled water, add 25 mils of a cold, saturated solution of sodium bicarbonate and a few drops of starch T.S. and immediately titrate this solution with tenth-normal iodine V.S., to the production of a permanent blue color. It shows not less than 98.5 per cent. of $K(SbO)C_4H_4O_6+\frac{1}{2}H_2O$.

Each mil of tenth-normal iodine V.S. used corresponds to 0.016617 Gm. of $K(SbO)C_4H_4O_6+\frac{1}{2}H_2O$. Each gramme of Antimony and Potassium Tartrate corresponds to not less than 59.3 mils of tenth-normal iodine V.S.

Preparations—Mistura Glycyrrhizæ Composita Syrupus Scillæ Compositus.

AVERAGE DOSE—Expectorant, Metric, 0.005 Gm.—Apothecaries, $\frac{1}{12}$ grain.

ANTIPYRINA

Antipyrine

Antipyr.—Phenazone

Phenyldimethylpyrazolon [$C_{11}H_{12}ON_2$ or $C_3HON_2(CH_3)_2.C_6H_5 = 188.12$]. Preserve it in well-closed containers.

Antipyrine occurs as a white, almost odorless, crystalline powder or in tabular crystals, with a slightly bitter taste.

One Gm. of Antipyrine dissolves in less than 1 mil of water, in 1.3 mils of alcohol, 1 mil of chloroform, and in 43 mils of ether, at 25° C.

Its aqueous solution (1 in 20) is neutral to litmus.

It melts between 111° and 113° C.

The addition of tannic acid T.S. to an aqueous solution of Antipyrine produces an abundant white precipitate.

Mix 0.1 Gm. of sodium nitrite and 12 mils of an aqueous solution of Antipyrine (1 in 100); a nearly colorless liquid is obtained, which, upon the addition of 1 mil of diluted sulphuric acid, develops a deep green color due to the formation of isonitroso-antipyrine.

One drop of ferric chloride T.S. added to 2 mils of a dilute aqueous solution of Antipyrine (1 in 1000) produces a deep red color, which, upon the addition of 10 drops of sulphuric acid, is changed to light yellow.

Incinerate about 1 Gm. of Antipyrine; not more than 0.1 per cent. of ash remains.

Antipyrine is completely soluble in 1 part of cold distilled water, the solution being colorless or at most slightly yellow when viewed crosswise in a test tube of about 20 mm. in diameter.

An aqueous solution of Antipyrine does not respond to the Test for heavy metals (see Part II, Test No. 3).

AVERAGE DOSE—Metric, 0.3 Gm.—Apothecaries, 5 grains.

APOMORPHINÆ HYDROCHLORIDUM

Apomorphine Hydrochloride

Apomorph. Hydrochl.—Apomorphine Chloride

The hydrochloride [$C_{17}H_{17}O_2NHCl + \frac{1}{2}H_2O = 312.62$] of an alkaloid prepared from morphine by the abstraction of one molecule of water. Preserve it, protected from light, in small, well-stoppered vials, which have been previously rinsed with diluted hydrochloric acid and dried.

Apomorphine Hydrochloride must be rejected if it imparts at once an emerald-green color to 100 parts of distilled water when shaken with it in a test tube.

Apomorphine Hydrochloride occurs in minute, white or grayish-white, glistening, monoclinic prisms; odorless, and acquiring a greenish tint upon exposure to light and air.

One Gm. of Apomorphine Hydrochloride dissolves in 50 mils of water and in 50 mils of alcohol at 25° C.; also in 17 mils of water at 80° C.; very slightly soluble in chloroform or ether.

Its saturated aqueous solution is neutral to litmus.

The salt loses its water of crystallization slowly over sulphuric acid and the anhydrous salt regains the water lost when exposed to the air.

The addition of a solution of sodium bicarbonate to an aqueous solution of the salt (1 in 100) produces a white or pale greenish-white precipitate, which rapidly becomes green on exposure to air and then dissolves in ether with a violet color and in chloroform with a violet-blue color. The salt dissolves in nitric acid with a dark purple color.

Silver nitrate T.S., added to an aqueous solution of the salt, produces a white precipitate, insoluble in nitric acid; the precipitate soon turns black by reduction to metallic silver, and is instantly reduced by the addition of ammonia water.

No weighable ash remains on incinerating 0.2 Gm. of Apomorphine Hydrochloride.

Shake about 0.1 Gm. of the salt with 10 mils of ether; the latter acquires not more than a pale reddish color (*decomposition products*).

		Metric	Apothecaries
AVERAGE DOSE—	Expectorant,	0.003 Gm.—	1/20 grain.
	Emetic, by mouth,	0.01 Gm.—	1/6 grain.
	Emetic, hypodermic,	0.005 Gm.—	1/12 grain.

AQUA

Water

Water is a colorless, limpid liquid, practically tasteless and odorless. When heated nearly to the boiling point and agitated, no disagreeable odor is evolved.

Water is neutral to litmus.

Evaporate 100 mils of Water in a platinum dish; it leaves a residue weighing not more than 0.03 Gm. (*solids*) and this residue, when carefully heated to redness, evolves no visible fumes and shows no appreciable charring (*organic impurities*).

Add 1 mil of hydrochloric acid to 100 mils of Water and then add 50 mils of hydrogen sulphide T.S.; it shows no darkening after standing fifteen minutes (*lead or copper*).

Add 1 mil of hydrochloric acid to 100 mils of Water and then add 1 mil of potassium ferrocyanide T.S.; no blue coloration is produced immediately (*iron*).

Add 0.5 mil of tenth-normal silver nitrate V.S. to 200 mils of Water, heat to boiling, filter and add to the filtrate 3 drops of potassium chromate T.S.; a red precipitate is produced (*chloride*).

Add 1 drop of hydrochloric acid, 1 mil of sulphanilic acid T.S. and 1 mil of naphthylamine hydrochloride T.S. to 100 mils of Water in a Nessler jar, stirring with a glass rod after each addition. Closely cover the jar with a glass plate, place it upon a white surface and view it from above; no pink coloration appears within five minutes (*nitrite*).

Add 1 mil of sodium carbonate T.S. to 100 mils of Water and evaporate the liquid in a small porcelain dish just to dryness. Moisten the residue thoroughly with 2 mils of phenolsulphonic acid T.S., gently warm the dish, add 20 mils of ammonia water and sufficient distilled water to measure 100 mils. Any yellow color produced is not greater than that obtained by evaporating 0.0021 Gm. of potassium nitrate, dissolved in 3 mils of distilled water and 1 mil of sodium carbonate T.S., to dryness and treating the residue in the same manner as the residue from the Water. The comparison of colors must be made in Nessler jars of the same diameter and size (*nitrate*).

Add 2 mils of alkaline mercuric potassium iodide T.S. to 100 mils of Water in a Nessler jar and mix thoroughly. Place the jar on a white surface and view the contents from above; the water does not at once assume a deep yellow or orange color (*ammonium compounds*).

Mix 100 mils of Water with 10 mils of diluted sulphuric acid in a clean porcelain dish and heat it rapidly to boiling, then add 0.1 mil of tenth-normal potassium permanganate V.S. and boil the liquid for ten minutes; the color of the liquid is not completely destroyed (oxygen consuming capacity as a measure of *organic impurities*).

AQUA AMMONIÆ

Ammonia Water

Aq. Ammon.

An aqueous solution of ammonia [$NH_3 = 17.03$] containing not less than 9.5 per cent. nor more than 10.5 per cent. by weight of NH_3. This solution deteriorates on keeping, and must be tested frequently. Preserve it in a cool place in glass-stoppered bottles made of hard glass free from lead.

Ammonia Water is a colorless, transparent liquid, having a very pungent characteristic odor and a caustic, alkaline taste. Dense white fumes are produced on bringing a glass rod, dipped into hydrochloric acid, near the surface of Ammonia Water.

Ammonia Water is strongly alkaline to litmus.

Specific gravity: about 0.958 at 25° C.

Add 0.1 mil of tenth-normal potassium permanganate V.S. to 10 mils of Ammonia Water, which has been slightly supersaturated with diluted sulphuric acid; the pink color is not completely destroyed within ten minutes (*oxidizable and empyreumatic substances*).

When neutralized and made slightly acid with hydrochloric acid, 10 mils of Ammonia Water does not respond to the Test for heavy metals (see Part II, Test No. 3).

Twenty-five mils of Ammonia Water, when evaporated to dryness in a platinum or porcelain dish and heated to constant weight at 120° C., leaves not more than 0.005 Gm. of residue.

Assay—Pour about 5 mils of Ammonia Water into a tared, stoppered weighing-bottle containing about 10 mils of distilled water and weigh accurately. Dilute the liquid with 50 mils of distilled water and titrate with normal sulphuric acid V.S., using litmus or methyl orange T.S. as indicator. It shows not less than 9.5 per cent. nor more than 10.5 per cent., by weight, of NH_3.

Each mil of normal sulphuric acid V.S. used corresponds to 0.01703 Gm. of NH_3. Each gramme of Ammonia Water corresponds to not less than 5.57 mils nor more than 6.16 mils of normal sulphuric acid V.S.

Preparations—Linimentum Ammoniæ Spiritus Ammoniæ Aromaticus.

AVERAGE DOSE—Metric, 1 mil—Apothecaries, 15 minims.

AQUA AMMONIÆ FORTIOR

Stronger Ammonia Water

Aq. Ammon. Fort.

An aqueous solution of ammonia [$NH_3 = 17.03$] containing not less than 27 per cent. nor more than 29 per cent., by weight, of NH_3. This solution deteriorates on keeping, and must be tested frequently. Preserve it in a cool place in partially filled, strong, glass-stoppered bottles made of hard glass free from lead. *Great caution should be used in handling this liquid.*

Stronger Ammonia Water is a colorless, transparent liquid, having an excessively pungent, characteristic odor and a very caustic and alkaline taste. *Stronger Ammonia Water must never be tasted unless greatly diluted.*

Stronger Ammonia Water is strongly alkaline to litmus.

Specific gravity: about 0.897 at 25° C.

Stronger Ammonia Water, when diluted with twice its volume of distilled water, responds to the tests for identity and purity under *Aqua Ammoniæ.*

Assay—Pour about 2 mils of Stronger Ammonia Water into a tared flask containing about 50 mils of distilled water, weigh accurately, and titrate with normal sulphuric acid V.S., using litmus or methyl orange T.S. as indicator. It shows not less than 27 per cent. nor more than 29 per cent., by weight, of NH_3.

Each mil of normal sulphuric acid V.S. used corresponds to 0.01703 Gm. of NH_3. Each gramme of Stronger Ammonia Water corresponds to not less than 15.8 mils nor more than 17 mils of normal sulphuric acid V.S.

AQUA AMYGDALÆ AMARÆ

Bitter Almond Water

Aq. Amygd. Amar.

OIL OF BITTER ALMOND, *one milliliter*	1 mil
DISTILLED WATER, recently boiled, *nine hundred and ninety-nine milliliters*	999 mils
To make *one thousand milliliters*	1000 mils

Dissolve the oil of bitter almond in the recently boiled distilled water by agitation, and filter.

NOTE—Bitter Almond Water contains a mere trace of hydrocyanic acid and differs from the preparation of the same name, recommended by the International Protocol, 1906, which contains 0.1 per cent. of hydrocyanic acid.

AVERAGE DOSE—Metric, 4 mils—Apothecaries, 1 fluidrachm.

AQUA ANISI

Anise Water

Aq. Anisi

OIL OF ANISE, *two milliliters*	2 mils
PURIFIED TALC, *fifteen grammes*	15 Gm.
DISTILLED WATER, recently boiled, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Prepare the Anise Water by the General Process described under *Aquæ Aromaticæ* (page 60).

Average dose—Metric, 15 mils—Apothecaries, 4 fluidrachms

AQUA AURANTII FLORUM

Orange Flower Water

Aq. Aurant. Flor.

Stronger Orange Flower Water,
Distilled Water, recently boiled, each, *one volume.*

Mix them immediately before use.

Orange Flower Water complies with the tests for identity and purity given under *Aqua Aurantii Florum Fortior.*

Preparation—Syrupus Aurantii Florum.

AQUA AURANTII FLORUM FORTIOR

Stronger Orange Flower Water

Aq. Aurant. Flor. Fort.

The saturated aqueous distillate prepared by distilling the fresh flowers of *Citrus Aurantium amara* Linné (Fam. *Rutaceæ*) with water. Preserve it in bottles stoppered with a pledget of purified cotton and in a dark, cool place.

Stronger Orange Flower Water is colorless and clear or only faintly opalescent, and possesses a strong and pleasant odor and taste of orange blossoms, and must be free from empyreuma, mustiness, or mucoid growths.

It is neutral or only slightly acid to litmus, and 100 mils, when evaporated to dryness on a water bath and the residue subsequently dried in an oven to constant weight at 100° C., yields not more than 0.001 Gm. of residue. It gives no reaction with hydrogen sulphide T.S. or with sodium sulphide T.S. (*metallic impurities*).

Preparation—Aqua Aurantii Florum.

AQUA CAMPHORÆ

Camphor Water

Aq. Camph.

Camphor, *eight grammes*	8 Gm.
Alcohol, *eight milliliters*	8 mils
Purified Talc, *fifteen grammes*	15 Gm.
Distilled Water, recently boiled, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Triturate the camphor with the alcohol in a mortar, add the purified talc; continue the trituration until the alcohol has evaporated and add the recently boiled distilled water. Filter the mixture, and pass the filtrate repeatedly through the filter until the Camphor Water is perfectly clear.

Average dose—Metric, 10 mils—Apothecaries, 2½ fluidrachms.

AQUA CHLOROFORMI

Chloroform Water

Aq. Chlorof.

Chloroform,
Distilled Water, recently boiled, each, *a sufficient quantity.*

To a convenient quantity of recently boiled distilled water, contained in a dark amber-colored bottle, add enough chloroform to maintain a slight excess of the chloroform after the contents have been repeatedly and thoroughly shaken. Preserve it in a cool, dark place.

When Chloroform Water is required for use, pour off the needed quantity, refill the bottle with recently boiled distilled water and saturate it by thorough agitation, taking care that there be always an excess of chloroform present.

Average dose—Metric, 15 mils—Apothecaries, 4 fluidrachms.

AQUA CINNAMOMI

Cinnamon Water

Aq. Cinnam.

Oil of Cinnamon, *two milliliters*........................	2 mils
Purified Talc, *fifteen grammes*........................	15 Gm.
Distilled Water, recently boiled, *a sufficient quantity,*	
To make *one thousand milliliters*...........	1000 mils

Prepare the Cinnamon Water by the General Process described under *Aquæ Aromaticæ* (page 60).

Average dose—Metric, 15 mils—Apothecaries, 4 fluidrachms.

AQUA CREOSOTI

Creosote Water

Aq. Creosot.

Creosote, *ten milliliters*	10 mils
Distilled Water, recently boiled, *nine hundred and ninety milliliters*	990 mils
To make *one thousand milliliters*	1000 mils

Agitate the creosote vigorously with the recently boiled distilled water and filter, returning the filtrate to the filter until it is perfectly clear. This preparation must not be dispensed unless it has been recently prepared.

Average dose—Metric, 10 mils— Apothecaries, 2½ fluidrachms.

AQUA DESTILLATA

Distilled Water

Aq. Dest.

Water [$H_2O = 18.016$] purified by distillation.

Water, *one thousand volumes*	1000 vol.
To make *seven hundred and fifty volumes*	750 vol.

Distil the water from a suitable apparatus provided with a block-tin or glass condenser. Collect the first *one hundred volumes* and reject this portion. Then collect *seven hundred and fifty volumes* and keep the Distilled Water in glass-stoppered bottles, which have been rinsed with hot distilled water immediately before being filled.

Distilled Water is a colorless, limpid liquid, without odor or taste, and neutral to the official indicators (see Part II).

Separate portions of 100 mils each of Distilled Water are not affected by the addition of barium chloride T.S. (*sulphate*); silver nitrate T.S. (*chloride*); ammonium oxalate T.S. (*calcium*); hydrogen sulphide T.S., or sodium sulphide T.S. (*metals*).

Distilled Water shows no deep yellow, orange or brown coloration when 1 mil of Nessler's reagent is added to 100 mils of the Water (*ammonia*).

Add 50 mils of calcium hydroxide T.S. to 25 mils of Distilled Water; the mixture remains clear and transparent (*carbon dioxide*).

Evaporate 100 mils of Distilled Water to dryness on a water bath and subsequently dry the residue in an oven to constant weight at 100° C.; not more than 0.001 Gm. of residue remains.

Heat 100 mils of Distilled Water to boiling, acidulate it with 10 mils of diluted sulphuric acid, and subsequently add 0.1 mil of tenth-normal potassium permanganate V.S. The color of the liquid is not completely destroyed by boiling it for ten minutes (*organic or other oxidizable substances*).

AQUA DESTILLATA STERILISATA

Sterilized Distilled Water

Aq. Dest. Steril.

Water, freshly distilled, *a sufficient quantity.*

Transfer the necessary quantity of freshly distilled water to a flask of hard glass of sufficient size which has previously been cleansed and sterilized as described under *Sterilization* (see Part II). Close the mouth of the flask with a pledget of sterilized purified cotton, boil the contents for thirty minutes and allow the water to cool without removing the cotton plug. Finally protect the mouth of the flask and the cotton pledget from infection through dust by wrapping the top of the flask tightly with paper.

Sterilized Distilled Water should be used within forty-eight hours after its preparation.

AQUA FŒNICULI

Fennel Water

Aq. Fœnic.

Oil of Fennel, *two milliliters*	2 mils
Purified Talc, *fifteen grammes*	15 Gm.
Distilled Water, recently boiled, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Prepare the Fennel Water by the General Process described under *Aquæ Aromaticæ* (page 60).

Average dose—Metric, 15 mils—Apothecaries, 4 fluidrachms.

AQUA HAMAMELIDIS

Hamamelis Water

Aq. Hamam.—Witch Hazel Water Distilled Extract of Witch Hazel

A saturated aqueous liquid obtained by distilling with steam or water the bark, twigs, smaller stems or the entire shrub of *Hamamelis virginiana* Linné (Fam. *Hamamelidaceæ*) collected in the autumn, and adding *one hundred and fifty mils* of alcohol to each *eight hundred and fifty mils* of distillate. Preserve it in tightly-closed containers in a cool place.

Hamamelis Water is a clear and colorless, or not more than faintly opalescent or slightly yellowish liquid having a characteristic odor and taste. It is neutral or only faintly acid to litmus.

Specific gravity: 0.979 to 0.982 at 25° C.

It must be free from mucoid or fungous growths and must not have an acetous odor. It gives no reaction with hydrogen sulphide T.S. or with sodium sulphide T.S. (*metallic impurities*).

Evaporate 100 mils of Hamamelis Water to dryness on a water bath; not more than 0.025 Gm. of residue remains (*dissolved impurities*).

It contains not less than 14 per cent. of absolute alcohol, by volume, when estimated as directed under Determination of alcohol in official preparations (see Part II, Test No. 14).

Add 8 drops of an aqueous solution of resorcinol (1 in 200) to 5 mils of Hamamelis Water and then carefully pour this upon 5 mils of sulphuric acid, contained in a test tube, in such a manner that the two liquids do not mix. After standing for three minutes a rose-red ring does not appear at the line of contact of the liquids nor does a distinct, white layer appear above this zone (*formaldehyde*).

Ten mils of Hamamelis Water gives no reaction for methyl alcohol when tested as directed under *Alcohol* for the detection of methyl alcohol.

AQUA MENTHÆ PIPERITÆ

Peppermint Water

Aq. Menth. Pip.

OIL OF PEPPERMINT, *two milliliters*	2 mils
PURIFIED TALC, *fifteen grammes*	15 Gm.
DISTILLED WATER, recently boiled, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Prepare the Peppermint Water by the General Process described under *Aquæ Aromaticæ* (page 60).

AVERAGE DOSE—Metric, 15 mils—Apothecaries, 4 fluidrachms.

AQUA MENTHÆ VIRIDIS

Spearmint Water

Aq. Menth. Vir.

OIL OF SPEARMINT, *two milliliters*	2 mils
PURIFIED TALC, *fifteen grammes*	15 Gm.
DISTILLED WATER, recently boiled, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Prepare the Spearmint Water by the General Process described under *Aquæ Aromaticæ* (page 60).

AVERAGE DOSE—Metric, 15 mils—Apothecaries, 4 fluidrachms.

AQUA ROSÆ

Rose Water

Aq. Ros.

Stronger Rose Water,
Distilled Water, recently boiled, each, *one volume.*

Mix them immediately before use.

Rose Water complies with the tests for identity and purity described under *Aqua Rosæ Fortior.*

AQUA ROSÆ FORTIOR

Stronger Rose Water

Aq. Ros. Fort.

The saturated aqueous distillate prepared by distilling the fresh flowers of *Rosa centifolia* Linné (Fam. *Rosaceæ*) with water. Preserve it in bottles stoppered with a pledget of purified cotton, in a cool, dark place.

Stronger Rose Water is colorless and clear, and possesses a strong and pleasant odor and a taste of fresh rose blossoms, and must be free from empyreuma, mustiness, or mucoid growths.

It is neutral or only slightly acid to litmus and 100 mils, when evaporated to dryness on a water bath and the residue subsequently dried in an oven to constant weight at 100° C., yields not more than 0.001 Gm. of residue. It gives no reaction with hydrogen sulphide T.S. or with sodium sulphide T.S. (*metallic impurities*).

Preparations—Aqua Rosæ Unguentum Aquæ Rosæ.

AQUÆ AROMATICÆ

Aromatic Waters

Aromatic Waters, when prepared from volatile oils, are intended to be, as nearly as practicable, saturated solutions, which must be clear and free from solid impurities, and, unless otherwise directed, should be made by the following general process:

General Process

Volatile Oil, *two milliliters*	2 mils
Purified Talc, *fifteen grammes*	15 Gm.
Distilled Water, recently boiled, *one thousand milliliters*	1000 mils

Triturate the volatile oil with the purified talc, add the recently boiled distilled water gradually with continued trituration, filter, and pass the filtrate through the filter repeatedly until the Aromatic Water is perfectly clear.

If preferred, the solution of the volatile oil may be made by replacing the purified talc by purified siliceous earth, or by pulped filter paper; or a solution of the volatile oil may be prepared with recently boiled distilled water, by direct addition and filtration, after shaking. Aromatic Waters may also be made by the distillation of a mixture of the drug or volatile oil with water. In each case the method used must yield a finished product which meets the official requirements and corresponds with that obtained by the general process. Aromatic Waters should not be permitted to freeze.

ARGENTI NITRAS

Silver Nitrate

Arg. Nit.

It contains, when finely powdered and dried to constant weight in a desiccator over sulphuric acid, in the dark, not less than 99.8 per cent. of $AgNO_3$ (169.89). Preserve it in dark amber-colored vials, protected from light.

Silver Nitrate occurs as colorless, transparent, tabular, rhombic crystals, becoming gray or grayish-black on exposure to light in the presence of organic matter; without odor, but having a bitter, caustic and strongly metallic taste.

One Gm. of Silver Nitrate dissolves in 0.4 mil of water and in 30 mils of alcohol at 25° C.; also in slightly more than 0.1 mil of boiling water and in 6.5 mils of boiling alcohol; slightly soluble in ether.

When heated in a porcelain crucible to about 200° C., the salt melts, forming a faintly yellow liquid, which, on cooling, congeals to a pure white, crystalline mass. At a higher temperature it is gradually decomposed with the evolution of nitrogen oxides.

An aqueous solution of the salt (1 in 10) is clear and colorless and is neutral to litmus.

Hydrochloric acid added to an aqueous solution of the salt (1 in 50) produces a white, curdy precipitate, insoluble in nitric acid, but readily soluble in ammonia water.

Mix an aqueous solution of the salt (1 in 10) in a test tube with a drop of diphenylamine T.S. and then carefully pour on sulphuric acid so as to form a separate layer; a deep blue color appears at the line of contact.

An aqueous solution of the salt (1 in 10) is not colored even faintly blue by the addition of an excess of ammonia water (*copper*).

Assay—Dissolve about 0.8 Gm. of finely powdered Silver Nitrate, previously dried in a desiccator over sulphuric acid, in the dark, and accurately weighed, in 50 mils of distilled water, add 2 mils of nitric acid and 2 mils of ferric ammonium sulphate T.S. and titrate the mixture with tenth-normal potassium sulphocyanate V.S. It shows, in the dried salt, not less than 99.8 per cent. of $AgNO_3$.

Each mil of tenth-normal potassium sulphocyanate V.S. used corresponds to 0.016989 Gm. of $AgNO_3$. Each gramme of Silver Nitrate, dried to constant weight, corresponds to not less than 58.7 mils of tenth-normal potassium sulphocyanate V.S.

Preparation—Argenti Nitras Fusus.

AVERAGE DOSE—Metric, 0.01 Gm.—Apothecaries, $\frac{1}{6}$ grain.

ARGENTI NITRAS FUSUS

Moulded Silver Nitrate

Arg. Nit. Fus.—Fused Silver Nitrate Lunar Caustic

It contains not less than 94.5 per cent. of $AgNO_3$ (169.89).

SILVER NITRATE, *one hundred grammes*	100 Gm.
HYDROCHLORIC ACID, *four grammes*	4 Gm.

Add the hydrochloric acid to the silver nitrate, contained in a porcelain dish, and melt the mixture at as low a temperature as possible. Stir it well, and pour the melted mass into suitable moulds. Preserve it in dark amber-colored vials, protected from light.

Moulded Silver Nitrate is a white, hard solid, generally in the form of pencils or cones, showing a fibrous fracture, becoming gray or grayish-black on exposure to light; odorless, and having a bitter, caustic, and strongly metallic taste.

One Gm. of Moulded Silver Nitrate, with the exception of about 5 per cent. which is silver chloride, dissolves in 0.4 mil of water and in 30 mils of alcohol at 25° C.; also in slightly more than 0.1 mil of boiling water and in 6.5 mils of boiling alcohol; slightly soluble in ether.

A filtered, aqueous solution of Moulded Silver Nitrate (1 in 10) is neutral to litmus, and responds to the tests for identity and purity under *Argenti Nitras*.

Assay—Add about 0.8 Gm. of Moulded Silver Nitrate, accurately weighed, to 50 mils of distilled water and, when the silver nitrate has dissolved, filter the solution. Thoroughly wash the filter and sediment with distilled water, add 2 mils of nitric acid and 2 mils of ferric ammonium sulphate T.S. to the mixed filtrate and washings and titrate this liquid with tenth-normal potassium sulphocyanate V.S. It shows not less than 94.5 per cent. of $AgNO_3$.

Each mil of tenth-normal potassium sulphocyanate V.S. used corresponds to 0.016989 Gm. of $AgNO_3$. Each gramme of Moulded Silver Nitrate corresponds to not less than 55.6 mils of tenth-normal potassium sulphocyanate V.S.

ARGENTI OXIDUM

Silver Oxide

Arg. Oxid.

It contains, when dried to constant weight at 120° C., not less than 99.6 per cent. of Ag_2O (231.76). Preserve it in well-stoppered, dark amber-colored vials. It must not be triturated with readily oxidizable or combustible substances, and must not be brought in contact with ammonia.

Silver Oxide is a heavy, dark brownish-black powder, easily reduced by exposure to light; odorless, and having a metallic taste.

Silver Oxide is very slightly soluble in water, to which, however, it imparts an alkaline reaction; insoluble in alcohol; it is dissolved by nitric acid.

When heated in a porcelain crucible to about 250° to 300° C., Silver Oxide is rapidly decomposed, with the evolution of oxygen, leaving a residue of metallic silver.

Dissolve about 0.2 Gm. of the Oxide in a mixture of 1 mil of nitric acid and 2 mils of distilled water, add 10 mils of ammonia water and dilute the liquid to 60 mils; 10 mils of this solution does not immediately become cloudy upon the addition of 1 mil of nitric acid (*chloride*).

A solution of the Oxide in nitric acid is colorless, and responds to the tests for identity and purity under *Argenti Nitras* when the tests are applied to a solution of proportionate strength.

Assay—Dissolve about 0.5 Gm. of Silver Oxide, previously dried to constant weight at 120° C. and accurately weighed, in 3 mils of nitric acid and 50 mils of distilled water in a flask, add 2 mils of ferric ammonium sulphate T.S. and titrate the mixture with tenth-normal potassium sulphocyanate V.S. It shows, in the dried Silver Oxide, not less than 99.6 per cent. of Ag_2O.

Each mil of tenth-normal potassium sulphocyanate V.S. used corresponds to 0.011588 Gm. of Ag_2O. Each gramme of Silver Oxide, dried to constant weight, corresponds to not less than 86.0 mils of tenth-normal potassium sulphocyanate V.S.

AVERAGE DOSE—Metric, 0.06 Gm.—Apothecaries, 1 grain.

ARNICA

Arnica

Arnic.—Arnica Flowers

The dried flower-heads of *Arnica montana* Linné (Fam. *Compositæ*).

Consisting chiefly of the tubular and ligulate flowers, occasionally with the involucre and receptacle present; involucral bracts narrowly lanceolate, about 1 cm. in length, dark green and pubescent; receptacle slightly convex, deeply pitted and densely short-hairy; ray flowers bright yellow, the ligulate portion 2 cm. in length, more or less folded lengthwise, 3-toothed, 7- to 12-veined, pistillate; tubular flowers perfect, reddish-yellow, stamens without a tail-like appendage (distinguished from anthers in flowers of *Inula Helenium* Linné, which have two bristles or long tails at the base); the achenes spindle-shaped, from 5 to 7 mm. in length, dark brown, finely striate, glandular-pubescent and surmounted by a pappus a little longer than the achene and composed of a single circle of nearly white barbellate bristles; odor characteristic and agreeable; taste bitter and acrid.

The powder is yellowish-brown; pollen grains numerous, from 0.025 to 0.035 mm. in diameter, spherical, triangular in section and spinose; non-glandular hairs of three kinds, either unicellular, 4- to 6-celled, or consisting of a pair of unicellular hairs with numerous pores on the dividing wall; glandular hairs of three kinds, either with a large unicellular stalk and a unicellular, glandular head, or with a 4-celled stalk and a unicellular, glandular head, or a stalk of a double row of 5 cells and a 2-celled, glandular head; pappus consisting of a multicellular axis with unicellular branches.

Arnica yields not more than 9 per cent. of ash.

Preparation—Tinctura Arnicæ.

ARSENI IODIDUM

Arsenous Iodide

Arsen. Iod.—Arsenic Iodide

It contains, when dried to constant weight in a desiccator over sulphuric acid, not less than 99 per cent. of AsI_3 (455.72). Preserve it in amber-colored, glass-stoppered vials, in a cool place, protected from light.

Arsenous Iodide is an orange-red, inodorous, crystalline powder, stable when protected from direct sunlight and kept in a cool place.

One Gm. of Arsenous Iodide dissolves in about 12 mils of water at 25° C., with partial decomposition; soluble in alcohol, chloroform, ether, or carbon disulphide.

No loss of iodine occurs when dry Arsenous Iodide is heated on a water bath, but at higher temperatures it volatilizes, leaving not more than 0.5 per cent. of residue. When warmed with a few drops of nitric acid, brown vapors of nitrogen oxides are evolved, followed by violet vapors of iodine.

A freshly prepared aqueous solution of the salt is colorless, but upon standing it gradually decomposes with the formation of arsenous and hydriodic acids and becomes yellow.

Add hydrogen sulphide T.S. to an aqueous solution of Arsenous Iodide, acidulated with hydrochloric acid; a lemon-yellow precipitate of arsenous sulphide is produced.

Add 1 mil of chlorine water to 5 mils of an aqueous solution of the salt (1 in 20); iodine is liberated and imparts to the solution a light reddish-brown color. Agitate this mixture with 1 mil of chloroform; the latter acquires a violet color.

Assay—Proceed as directed under the Assay for iodides (see Part II, Test No. 5), using about 0.5 Gm. of Arsenous Iodide, previously dried to constant weight in a desiccator over sulphuric acid and accurately weighed. It shows, in the dried salt, not less than 99 per cent. of AsI_3.

Each mil of tenth-normal silver nitrate V.S. corresponds to 0.015191 Gm. of AsI_3. Each gramme of Arsenous Iodide, dried to constant weight, corresponds to not less than 65.2 mils of tenth-normal silver nitrate V.S.

Preparation—Liquor Arseni et Hydrargyri Iodidi.

AVERAGE DOSE—Metric, 0.005 Gm.—Apothecaries, 1/12 grain.

ARSENI TRIOXIDUM

Arsenic Trioxide

Arsen. Triox.—Arsenous Acid Arsenous Oxide White Arsenic

It contains, when dried to constant weight at 100° C., not less than 99.8 per cent. of As_2O_3 (197.92).

Arsenic Trioxide occurs either as an opaque, white powder, or in irregular masses of two varieties: one, amorphous, transparent, and colorless, like glass; the other, crystalline, opaque, and white, resembling porcelain. Frequently the same piece has an opaque, white outer crust enclosing the glassy variety. Contact with moist air gradually changes the glassy into the white, opaque variety. Both are odorless.

Arsenic Trioxide is soluble in water, the amorphous or glassy variety being somewhat more soluble than the crystalline variety; it is slightly soluble in alcohol and in ether and freely soluble in glycerin and is dissolved by hydrochloric acid and alkaline solutions.

An aqueous solution of Arsenic Trioxide is faintly acid to litmus.

When slowly heated in a dry test tube of hard glass, Arsenic Trioxide yields a sublimate of minute, brilliant, transparent, octahedral crystals and does not show a yellow color (*arsenous sulphide*). When heated rapidly to about 200° C., the amorphous variety fuses, then sublimes, while the crystalline variety sublimes without fusing. Not more than 0.1 per cent. of residue remains after sublimation. When covered with charcoal in an ignition tube, and strongly heated, Arsenic Trioxide is reduced, and metallic arsenic is deposited on the cooler portion of the tube as a mirror, having a metallic luster, and this mirror is readily dissolved by solutions of sodium or calcium hypochlorite.

Hydrogen sulphide T.S. colors an aqueous solution of Arsenic Trioxide (1 in 100) yellow; on adding a few drops of hydrochloric acid to the colored solution, a lemon-yellow precipitate of arsenic trisulphide is produced, which is completely soluble in ammonium carbonate T.S. (*antimony, tin, and cadmium*).

Dissolve 1 Gm. of Arsenic Trioxide in 10 mils of ammonia water with the aid of a gentle heat; a colorless solution is produced.

Assay—Dissolve about 0.2 Gm. of Arsenic Trioxide, previously dried to constant weight at 100° C. and accurately weighed, in 20 mils of boiling distilled water by the gradual addition of sodium hydroxide T.S. until complete solution results. Neutralize this solution with diluted sulphuric acid V.S., using phenolphthalein T.S. as indicator, cool, dissolve in it 2 Gm. of sodium bicarbonate and titrate the mixture with tenth-normal iodine V.S., using starch T.S. as indicator. It shows, in the dried Arsenic Trioxide, not less than 99.8 per cent. of As_2O_3.

Each mil of tenth-normal iodine V.S. used corresponds to 0.004948 Gm. of As_2O_3. Each gramme of Arsenic Trioxide, dried to constant weight, corresponds to not less than 201.7 mils of tenth-normal iodine V.S.

Preparations—Liquor Acidi Arsenosi Liquor Potassii Arsenitis.

AVERAGE DOSE—Metric, 0.002 Gm.—Apothecaries, 1/30 grain.

ASAFŒTIDA

Asafetida

Asafœt.—Gum Asafetida

The gum-resin obtained by incising the rhizomes and roots of *Ferula Asafœtida* Linné and *Ferula fœtida* Regel and of some other species of *Ferula* (Fam. *Umbelliferæ*), indigenous to Persia and adjacent countries, and yielding not less than 60 per cent. (or if powdered 50 per cent.) of alcohol-soluble constituents.

In a soft mass, sometimes almost semi-liquid, or in irregular, more or less pliable masses composed of agglutinated tears of variable size imbedded in a yellowish-brown or dark brown matrix, or in loose ovoid tears, from 1 to 4 cm. in diameter, the surface sometimes containing streaks of violet, yellowish-red or brownish-red and with a few vegetable fragments; when fresh the mass is either soft or tough, becoming hard and occasionally even brittle on drying; the surface of the freshly fractured tears is milky-white and opaque, changing gradually on exposure to a pinkish or reddish-purple or even reddish-brown; on moistening with water, the tears become milky-white; odor persistent, alliaceous; taste bitter, alliaceous and acrid.

Triturate one part of Asafetida with three parts of water; it forms a milk-white emulsion which becomes yellowish on the addition of alkalies. Heat a fragment of one of the tears of Asafetida with sulphuric acid; a reddish-brown solution is formed; greatly dilute the latter with water, filter, and add an excess of any of the alkalies; the solution acquires a blue fluorescence, which becomes more pronounced upon the addition of a slight excess of ammonia water. An alcoholic solution of Asafetida, on the addition of a few drops of phloroglucinol T.S. and a few drops of hydrochloric acid, acquires a cherry-red color.

Add a few drops of ferric chloride T.S. to a portion of the alcoholic solution of Asafetida, obtained in the assay process given below; an olive-green color is produced (*most foreign resins*).

Add hydrochloric acid to another portion of the same alcoholic solution of Asafetida until a faint turbidity results; a bluish-green color is developed, which fades on standing (*galbanum*).

Evaporate a quantity of the same alcoholic solution, representing 5 Gm. of Asafetida, to 25 mils, mix it with 25 mils of petroleum benzin, in a separatory funnel, and afterwards add to it twice its volume of water and agitate. The petroleum benzin layer, after washing with water and subsequent separation, exhibits no green color when shaken with 30 mils of a freshly made aqueous solution of copper acetate (1 in 20) (*rosin*).

Mix 2 mils of emulsion, prepared as directed under *Emulsum Asafœtidæ*, with 5 mils of water and add 5 mils of sodium hypobromite T.S., so as to form a separate layer; a red color is not produced (*ammoniac*).

The yield of ash of the gum-resin does not exceed 15 per cent.

The powder is prepared by drying the gum-resin over freshly-burnt lime or by exposure to currents of warm air until it ceases to lose weight and then reducing it to a powder at a low temperature. Diluents of starch or magnesium carbonate may be added in order to maintain the powdered form. The color of powdered Asafetida is light brown.

The yield of ash of powdered Asafetida does not exceed 30 per cent.

Assay—Introduce about 10 Gm. of Asafetida into a tared, 250 mil Erlenmeyer flask, determine the exact weight of the drug, add 100 mils of alcohol, and having connected the flask with an upright condenser, boil the mixture in the flask during one hour or until the drug is completely disintegrated. Then transfer the contents of the flask to two counterpoised, plainly folded filters one within the other, so that the triple fold of the inner filter is laid against the single side of the outer, and wash the flask and filter with consecutive, small portions of boiling alcohol until the washings no longer produce a cloudiness when dropped into water. Collect and reserve the mixed alcoholic solutions, for the qualitative tests given above. Dry the filters and flask to a constant weight at a temperature of about 115° C. Now determine the weight of the residue on the filter and in the flask and calculate its percentage from the amount of Asafetida originally taken. This percentage of alcohol-insoluble material, when subtracted from 100, gives the percentage of alcohol-soluble constituents contained in the Asafetida.

Preparations—Emulsum Asafœtidæ Pilulæ Asafœtidæ Tinctura Asafœtidæ.

Average dose—Metric, 0.25 Gm.—Apothecaries, 4 grains.

ASPIDIUM

Aspidium

Male Fern

The rhizome and stipes of *Dryopteris Filix-mas* (Linné) Schott, or of *Dryopteris marginalis* (Linné) Asa Gray (Fam. *Polypodiaceæ*), collected in the autumn, freed from the roots and dead portions of rhizome and stipes and dried at a temperature not exceeding 70° C. Preserve Aspidium in tightly-closed containers and protect from light.

Usually with the blackish-brown outer layers removed; rhizome 1 to 3 cm. in thickness, cylindraceous and nearly straight, or curved and tapering toward one end, usually split longitudinally, roughly scarred with remains of the stipe-bases, or bearing several coarse longitudinal ridges and grooves; stipes cylindrical, 3 to 5 cm. in length, about 6 mm. in thickness, nearly straight or somewhat curved, tapering toward one end, and with occasional elongated patches of the still-adhering, blackish-brown outer layers; fracture short, pale green in the inner half, the texture rather spongy, and exhibiting, in an interrupted circle, from 6 to 12 vascular bundles, each surrounded with an endodermis; odor slight; taste sweetish, astringent, bitter, acrid. Use only such portions as have retained their green color.

Aspidium yields not more than 3 per cent. of ash.

Preparation—Oleoresina Aspidii.

Average dose—Metric, 4 Gm.—Apothecaries, 60 grains.

ASPIDOSPERMA

Aspidosperma

Aspidosp.—Quebracho

The dried bark of *Aspidosperma Quebracho blanco* Schlechtendal (Fam. *Apocynaceæ*), without the presence or admixture of more than 2 per cent. of wood or other foreign matter.

In irregular chips or in longitudinal pieces attaining a length of 14 cm. and a thickness of 35 mm.; outer corky layer from 3 to 25 mm. in thickness, brownish-gray or reddish-brown and deeply furrowed, frequently somewhat reticulate with longitudinal and shallow transverse fissures, the crevices being occasionally lined with the mycelia of a grayish mould; outer surface of bark, from which the cork has been separated, light brown or reddish-brown and usually more or less roughened; inner surface occasionally with adhering wood, otherwise light yellowish-brown to light reddish-brown, longitudinally finely striate and finely porous; fracture short-fibrous with projecting bast-fibers; nearly inodorous, taste bitter and slightly aromatic.

Under the microscope, transverse sections of Aspidosperma show a number of successive layers of cork separated by large groups of stone cells, isolated bast-fibers and parenchyma; inner bark with starch-bearing medullary rays 1 to 5 cells in width, separating narrow wedges composed of large prominent groups of stone cells in which are occasionally included one or more thick-walled bast-fibers; bast-fibers usually single, very thick-walled, strongly lignified and surrounded with crystal fibers and starch-bearing parenchyma.

The powder is reddish-brown; bast-fibers single, very long and surrounded by crystal fibers, the crystals being in prisms frequently terminated by pyramids and from 0.008 to 0.03 mm. in length; stone cells in large thick groups composed of numerous more or less tabular cells; cork cells more or less polygonal in outline with thick, slightly lignified walls; starch grains single or 2- to 4-compound, the individual grains spherical, ovoid or more or less plano-convex, from 0.003 to 0.025 mm. in diameter.

Preparation—Fluidextractum Aspidospermatis.

Average dose—Metric, 4 Gm.—Apothecaries, 60 grains.

ATROPINA

Atròpine

Atrop.

An alkaloid [$C_{17}H_{23}O_3N = 289.19$] obtained from belladonna and from some other plants of the *Solanaceæ*. Preserve it in well-closed containers, protected from light.

Atropine occurs in white rhombic prisms; odorless. *Great caution must be used in tasting it and then only in very dilute solution.*

One Gm. of Atropine dissolves in 455 mils of water, 2 mils of alcohol, about 27 mils of glycerin, 1 mil of chloroform, and in 25 mils of ether at 25° C.; also in 90 mils of water at 80° C. and in 1.2 mils of alcohol at 60° C.

Its saturated aqueous solutions are alkaline to litmus, and to phenolphthalein T.S.

It melts between 114° and 116° C.

Gold chloride T.S. yields in a solution of Atropine in dilute hydrochloric acid (1 in 50) a lusterless precipitate (distinction from *hyoscyamine,* which yields a lustrous precipitate).

Evaporate about 0.01 Gm. of Atropine to dryness in a porcelain dish on a water bath with a few drops of nitric acid; a yellow colored residue is produced. Cool this residue and add a few drops of alcoholic potassium hydroxide T.S. and a fragment of potassium hydroxide; an intensely violet color is produced. Hyoscyamine and hyoscine produce the same color, but the presence of strychnine or other alkaloids masks the reaction.

No weighable ash remains on incinerating 0.1 Gm. of Atropine.

About 0.1 Gm. of Atropine, dissolved in 2 mils of sulphuric acid, does not produce more than a slightly yellow solution (*readily carbonizable impurities*) and only a light yellow color is produced upon the further addition of 0.1 mil of nitric acid (*foreign alkaloids*).

In a solution of Atropine in dilute hydrochloric acid (1 in 50) platinic chloride T.S. produces no precipitate (*foreign alkaloids*).

An aqueous solution of Atropine (1 in 60), made with the aid of a slight excess of diluted sulphuric acid, is rendered turbid by the addition of a slight excess of sodium hydroxide T.S., but no turbidity is produced immediately upon the addition of 2 mils of ammonia water to 5 mils of the solution (*apoatropine, belladonnine*).

AVERAGE DOSE—Metric, 0.0005 Gm.—Apothecaries, 1/120 grain.

ATROPINÆ SULPHAS

Atropine Sulphate

Atrop. Sulph.

The sulphate [$(C_{17}H_{23}O_3N)_2H_2SO_4 + H_2O = 694.49$] of the alkaloid atropine.

Atropine Sulphate occurs as a white, crystalline powder or in microscopical needles and prisms; efflorescent in dry air; odorless. *Great caution must be used in tasting it and then only in very dilute solution.*

One Gm. of Atropine Sulphate dissolves in 0.4 mil of water, 5 mils of alcohol, 2.5 mils of glycerin, 120 mils of chloroform and in 3000 mils of ether at 25° C.; also in 2.5 mils of boiling alcohol.

An aqueous solution of the salt (1 in 20) is neutral to litmus.

It usually melts between 188° and 191° C., but when anhydrous and free from hyoscyamine, it melts between 181° and 183° C.

It responds to the other tests of identity and purity under *Atropina.*

Average dose—Metric, 0.0005 Gm.—Apothecaries, 1/120 grain.

AURANTII AMARI CORTEX

Bitter Orange Peel

Aurant. Amar. Cort.

The dried rind of the fruit of *Citrus Aurantium amara* Linné (Fam. *Rutaceæ*).

In narrow, thin bands (ribbons), or more often elliptical, flattened, more or less curved, pieces (quarters), varying from 3 to 6 cm. in length; outer surface convex, varying from reddish- or yellowish-brown (ribbons) to greenish-brown (quarters), coarsely reticulate and with the edges recurved; inner surface concave, whitish, with numerous conical projections and yellowish-white, linear more or less anastomosing fibro-vascular bundles; fracture hard; transverse section light brown, somewhat spongy, outer layer with 1 or 2 rows of oil reservoirs; odor fragrant; taste aromatic and bitter.

The powder is yellowish-white or light brown; fragments of parenchyma cells numerous, the walls from 0.004 to 0.012 mm. in thickness; few fragments of tracheæ with close spiral markings or simple pores; occasional membrane crystals of calcium oxalate in monoclinic prisms, from 0.02 to 0.035 mm. in diameter. Powdered Bitter Orange Peel is colored yellowish upon the addition of potassium hydroxide T.S.

Bitter Orange Peel yields not more than 7 per cent. of ash.

Preparations—Fluidextractum Aurantii Amari Tinctura Aurantii Amari
Tinctura Cinchonæ Composita Tinctura Gentianæ Composita.

Average dose—Metric, 1 Gm.—Apothecaries, 15 grains.

AURANTII DULCIS CORTEX

Sweet Orange Peel

Aurant. Dulc. Cort.

The outer rind of the fresh, ripe fruit of *Citrus Aurantium sinensis* Gallesio (Fam. *Rutaceæ*).

The outer, orange-yellow layer recently separated by grating or paring and consisting of epidermal cells, parenchyma cells of the sarcocarp with chromoplastids, oil reservoirs and globules of volatile oil; odor highly fragrant; taste pungently aromatic.

Preparation—Tinctura Aurantii Dulcis.

AURI ET SODII CHLORIDUM

Gold and Sodium Chloride

Aur. et Sod. Chlor.

A mixture of equal parts of anhydrous gold chloride [$AuCl_3 = 303.58$] and anhydrous sodium chloride [$NaCl = 58.46$], representing, when dried to constant weight in a desiccator over sulphuric acid, not less than 30 per cent. of metallic gold [Au]. Preserve it in well-stoppered, amber-colored vials.

Gold and Sodium Chloride occurs as an orange-yellow powder, odorless, having a saline and metallic taste, and deliquescent when exposed to damp air.

Gold and Sodium Chloride is very soluble in water; alcohol or ether dissolves the gold chloride leaving the sodium chloride.

A fragment imparts a persistent, intensely yellow color to a non-luminous flame.

An aqueous solution (1 in 100) shows a slightly acid reaction, and yields with silver nitrate T.S. a white precipitate insoluble in nitric acid but readily soluble in ammonia water.

Hold a glass rod, moistened with ammonia water, close to a portion of Gold and Sodium Chloride; no white fumes appear (*free hydrochloric acid*).

The filtrate from the precipitated gold in the following assay process, after acidulation with hydrochloric acid, is not affected by hydrogen sulphide T.S. (*metallic impurities*).

Assay—Dissolve about 0.5 Gm. of Gold and Sodium Chloride, previously dried to constant weight in a desiccator over sulphuric acid and accurately weighed in a stoppered flask, in 10 mils of distilled water in a porcelain dish. Render the solution alkaline by the addition of 10 mils of potassium hydroxide T.S., heat it for five minutes on a water bath, add 25 mils or an excess of solution of hydrogen dioxide and continue the heating for an hour on a water bath, or until the addition of a few drops of solution of hydrogen dioxide produces no further precipitation in the clear liquid. (During the heating on the water bath occasionally replace the liquid lost by evaporation by the addition of hot distilled water.) Wash the precipitate of metallic gold with distilled water slightly acidulated with hydrochloric acid, dry and ignite it. Its weight corresponds to not less than 30 per cent. of the weight of the dried Gold and Sodium Chloride taken.

AVERAGE DOSE—Metric, 0.005 Gm.—Apothecaries, 1/12 grain.

BALSAMUM PERUVIANUM

Balsam of Peru

Bals. Peruv.—Peru Balsam

A balsam obtained from *Toluifera Pereiræ* (Royle) Baillon (Fam. *Leguminosæ*).

Balsam of Peru is a viscid liquid of a dark brown color; free from stringiness or stickiness; transparent and reddish-brown in thin layers; of an agreeable, vanilla-like odor and a bitter, acrid taste, with a persistent after-taste. When swallowed it leaves a burning sensation in the throat. It does not harden on exposure to the air.

It is soluble in alcohol, chloroform, and glacial acetic acid with not more than a slight opalescence; only partly soluble in ether or petroleum benzin.

Water, when agitated with the Balsam, is acid to litmus.

Specific gravity: 1.130 to 1.160 at 25° C.

One Gm. of the Balsam forms a clear solution when shaken with a solution of 3 Gm. of hydrated chloral in 2 mils of distilled water (*fixed oils*).

Shake about 1 Gm. of the Balsam with 5 mils of purified petroleum benzin, and warm the mixture on a water bath for 10 minutes, adding a sufficient quantity of the solvent to replace the loss by evaporation. On evaporating 2 mils of the benzin solution, no odor of turpentine is noticeable, and when the residue is treated with a few drops of nitric acid, no green or bluish color is produced (*turpentine or rosin*).

Weigh accurately about 1 Gm. of the Balsam and dissolve it in 100 mils of alcohol, add 1 mil of phenolphthalein T.S. and titrate the solution with half-normal potassium hydroxide V.S. The acid number thus obtained is not less than 56 nor more than 84.

Mix about 3 Gm. of the Balsam, accurately weighed, with 30 mils of sodium hydroxide T.S. and shake the mixture for a few minutes with 60 mils of ether. Then add about 3 Gm. of powdered tragacanth, filter and transfer 50 mils of the ethereal filtrate (representing five-sixths of the weight of the Balsam taken) into a tared, conical flask. Evaporate the ether and dry the residue to constant weight at 100° C. The weight of the residue of cinnamein so obtained is not less than 50 per cent. nor more than 56 per cent. of the weight of the Balsam represented by the 50 mils of ethereal solution taken. Dissolve this residue in 25 mils of alcohol, add 25 mils of half-normal alcoholic potassium hydroxide V.S. and heat the mixture carefully in a flask provided with a reflux condenser, during half an hour on a water bath. Then add 1 mil of phenolphthalein T.S. and titrate the excess of alkali with half-normal hydrochloric acid V.S. The amount of half-normal alcoholic potassium hydroxide V.S. consumed corresponds to a saponification value for the cinnamein of from 235 to 238 (see Part II, Test No. 10).

BALSAMUM TOLUTANUM

Balsam of Tolu

Bals. Tolu.—Tolu Balsam

A balsam obtained from *Toluifera Balsamum* Linné (Fam. *Leguminosæ*).

Balsam of Tolu is a yellowish-brown, or brown, plastic solid, becoming brittle when old, dried, or exposed to cold. It is transparent in thin layers, has a pleasant, aromatic odor, resembling that of vanilla, and a mild, aromatic taste.

Balsam of Tolu is nearly insoluble in water and in petroleum benzin. It is soluble in alcohol, chloroform, and ether. It is dissolved by solutions of the fixed alkalies, usually leaving an insoluble residue.

An alcoholic solution of the Balsam (1 in 20) is acid to litmus.

Shake about 1 Gm. of the Balsam with 25 mils of carbon disulphide, allow it to stand for thirty minutes, filter the liquid and evaporate 15 mils of the filtrate to dryness. The residue thus obtained, when dissolved in glacial acetic acid, does not show a green color on the addition of a few drops of sulphuric acid (*rosin*). The remaining portion of the filtrate, when shaken with an equal volume of an aqueous solution of copper acetate (1 in 1000), does not acquire a green color (*rosin or copaiba*).

Dissolve about 1 Gm. of the Balsam, accurately weighed, in 50 mils of alcohol, add 1 mil of phenolphthalein T.S. and titrate the solution with half-normal alcoholic potassium hydroxide V.S. The acid number thus obtained is not less than 112 nor more than 168. Now add sufficient half-normal alcoholic potassium hydroxide V.S. to the neutralized liquid to make the total amount of the volumetric alkali solution exactly 20 mils; heat the liquid on a water bath for half an hour, under a reflux condenser, and allow it to cool. Mix this liquid with 200 mils of distilled water, or more if necessary, and titrate the excess of potassium hydroxide with half-normal sulphuric acid V.S.; the total amount of half-normal potassium hydroxide V.S. consumed corresponds to a saponification value of not less than 154 nor more than 220 (see Part II, Test No. 10).

Preparations—Syrupus Tolutanus (from Tincture) Tinctura Benzoini Compositа Tinctura Tolutana.

BELLADONNÆ FOLIA

Belladonna Leaves

Bellad. Fol.—Deadly Nightshade Leaves Belladonnæ folium P. I.

The dried leaves and tops of *Atropa Belladonna* Linné (Fam. *Solanaceæ*), without the presence or admixture of more than 10 per cent. of its stems or other foreign matter, and yielding not less than 0.3 per cent. of the total alkaloids of Belladonna Leaves.

Usually much twisted and matted together; leaves much crumpled; when soaked in water and spread out, the entire leaves from 6 to 20 cm. in length, 4 to 12 cm. in breadth, broadly ovate, summits acute, margins entire, narrowed into the long petioles; upper surfaces brownish-green, lower surfaces grayish-green, epidermis more or less papillose and slightly hairy; flowers with yellowish-purple, campanulate corollas; fruits globular, subtended by the calyx, dark green or greenish-brown, and with numerous small seeds; odor distinct, especially on moistening; taste somewhat bitter and acrid.

Stems of variable length not exceeding 7 mm. in diameter, longitudinally wrinkled, older parts smooth and usually hollow, younger parts flattened and finely hairy.

The powder is dark green, consisting of irregular fragments of leaf tissues and woody elements; calcium oxalate in sphenoidal micro-crystals; hairs few, the non-glandular being simple, 2- to 5-celled, the glandular with stalks of 1 to 3 cells; tracheæ with annular, spiral, scalariform or reticulate thickenings and with bordered pores; starch grains and pollen grains few; occasional fragments of the stems of Belladonna with long, thin-walled and slightly lignified bast-fibers.

Raphides must not be present (leaves and stems of *Phytolacca decandra* Linné).

Belladonna Leaves yield not more than 20 per cent. of ash.

Assay—Proceed as directed under *Belladonnæ Radix* (page 73), using 15 Gm. of Belladonna Leaves, in No. 60 powder, increasing the amount of water added after maceration to 25 mils and, before titration, treating the final residue twice with 5 mils of ether, evaporating to dryness each time.

Each mil of tenth-normal sulphuric acid V.S. consumed corresponds to 28.92 milligrammes of the total alkaloids of Belladonna Leaves.

Preparations — Extractum Belladonnæ Foliorum Tinctura Belladonnæ Foliorum Unguentum Belladonnæ (from Extract).

Average dose—Metric, 0.06 Gm.—Apothecaries, 1 grain.

BELLADONNÆ RADIX

Belladonna Root

Bellad. Rad.—Deadly Nightshade Root

The dried root of *Atropa Belladonna* Linné (Fam. *Solanaceæ*), without the presence or admixture of more than 10 per cent. of its stem-bases or other foreign matter, and yielding not less than 0.15 per cent. of the total alkaloids of Belladonna Root. Preserve Belladonna Root in tightly-closed containers adding a few drops of chloroform or carbon tetrachloride from time to time to prevent attack by insects.

Cylindrical or somewhat tapering, usually split into longitudinal pieces, from 0.5 to 2.5 cm. in thickness; externally pale brownish-gray, longitudinally wrinkled, outer layers of the periderm rather soft, frequently abraded, and thus showing lighter patches; fracture nearly smooth, mealy, on breaking, emitting a puff of dust consisting chiefly of starch grains; internally whitish, with a distinct cambium zone and yellowish wood wedges; nearly inodorous; taste sweetish, afterwards bitterish and strongly acrid.

Transverse sections of Belladonna Root when moistened with iodine T.S. are colored bluish-black and by transmitted light show an imperfectly radiate structure within and near a conspicuous cambium line. Under the microscope, sections exhibit a bark and wood composed mainly of parenchyma, the cells being filled with starch grains, single and 2- to 6- or more compound, the individual grains being somewhat spherical and from 0.003 to 0.03 mm. in diameter. A section cleared with hydrated chloral T.S. shows in both bark and wood occasional cells of parenchyma filled with sphenoidal micro-crystals of calcium oxalate; bark free from bast-fibers; wood containing scattered groups of large tracheæ with simple and bordered pores or reticulated thickenings, and associated in older roots with wood-fibers.

Stem fragments of Atropa Belladonna occur either separate or attached to the roots; light brown or greenish-brown; finely, longitudinally wrinkled, with transverse leaf-scars; pith frequently hollow.

Under the microscope, sections of Belladonna stem show beneath the endodermis an interrupted circle of bast-fibers either singly or in small groups, the walls of which are relatively thin and slightly lignified. In the internal phloem also occur isolated small groups of bast-fibers similar to those found in the inner bark.

The powder is light brown; starch grains numerous, from 0.003 to 0.030 mm. in diameter, spherical, plano-convex, polygonal, and 2- to 6- or more compound; sphenoidal micro-crystals numerous, from 0.003 to 0.010 mm. in length; fragments of cork cells and tracheæ with wood-fibers few; occasional fragments of stems of Belladonna showing long, thin-walled and slightly lignified bast-fibers.

Belladonna Root yields not more than 7 per cent. of ash.

Assay—Introduce 15 Gm. of Belladonna Root, in No. 60 powder, into a 250 mil flask and add 150 mils of a mixture of chloroform, 1 volume, and ether, 2 volumes. Stopper the flask, shake it well and allow it to stand ten minutes, then add 5 mils of ammonia water and shake the flask vigorously every ten minutes during two hours. Now add 15 mils of distilled water, again shake the flask well, and, when the drug has settled, decant 100 mils of the solution, representing 10 Gm. of Belladonna Root. Filter the solution through a pledget of purified cotton into a separator, and rinse the graduate and cotton with a little ether. Completely extract the alkaloids from the solution by shaking out repeatedly with weak sulphuric acid. Collect the acid washings in a separator, add ammonia water until the solution is decidedly alkaline to litmus, and completely extract the alkaloids by shaking out repeatedly with chloroform. Evaporate the combined chloroform washings to dryness, dissolve the alkaloids from the residue in exactly 5 mils of tenth-normal sulphuric acid V.S., and titrate the excess of acid with fiftieth-normal potassium hydroxide V.S., using cochineal T.S. as indicator.

Each mil of tenth-normal sulphuric acid V.S. consumed corresponds to 28.92 milligrammes of the total alkaloids of Belladonna Root (see Proximate Assays, Part II).

Preparations—Fluidextractum Belladonnæ Radicis Linimentum Belladonnæ (from Fluidextract).

AVERAGE DOSE—Metric, 0.045 Gm.—Apothecaries, $\frac{3}{4}$ grain.

BENZALDEHYDUM

Benzaldehyde

Benzaldehyd.

An aldehyde produced synthetically or obtained from oil of bitter almond and containing not less than 85 per cent. of C_7H_6O or $C_6H_5.CHO$ (106.05). Preserve it in small, well-stoppered bottles, protected from light.

Benzaldehyde is a colorless, or yellowish, strongly refractive liquid, having a bitter-almond-like odor, and a burning, aromatic taste.

It is slightly soluble in water, miscible with alcohol, ether, or fixed or volatile oils.

Specific gravity: about 1.045 at 25° C.

Shake 10 drops of Benzaldehyde with 5 mils of distilled water, add 0.5 mil of potassium hydroxide T.S. and 0.1 mil of ferrous sulphate T.S., and warm the mixture gently. Now add a slight excess of hydrochloric acid to the mixture; no greenish-blue color nor blue precipitate is produced within fifteen minutes (*hydrocyanic acid*).

Hold the looped end of a piece of clean copper wire in a non-luminous flame until it glows, without coloring the flame green, cool the wire, dip the loop into Benzaldehyde, ignite the latter and hold it so that the liquid burns outside of the non-luminous flame. On slowly bringing the flame from the burning Benzaldehyde on the loop in contact with the lower outer edge of the non-luminous flame, no green tinge is discernible (*chlorinated products*).

Dissolve 1 mil of Benzaldehyde in 20 mils of alcohol, add distilled water until a slight turbidity is produced, and maintain a brisk evolution of hydrogen for one hour by the addition of zinc and diluted sulphuric acid. Filter and evaporate the liquid to about 20 mils and boil 10 mils of the evaporated liquid with 1 drop of potassium dichromate T.S.; no violet color is produced (*nitrobenzene*).

Assay—Dissolve about 3 mils of freshly redistilled phenylhydrazine in 60 mils of alcohol and titrate 25 mils of the solution, which must always be freshly prepared, with half-normal hydrochloric acid V.S., using methyl orange T.S. as indicator. To about 1 Gm. of the Benzaldehyde, accurately weighed, add 25 mils of the phenylhydrazine solution just prepared and allow it to stand for thirty minutes. Add a drop of methyl orange T.S., and acidify the mixture by adding a measured excess of half-normal hydrochloric acid V.S. Filter the mixture and wash the precipitate with small portions of distilled water until the washings cease to redden blue litmus paper. Then titrate the excess of hydrochloric acid in the filtrate with half-normal potassium hydroxide V.S. Subtract the number of mils of half-normal hydrochloric acid V.S. consumed, from the number of mils of half-normal hydrochloric acid V.S. used in titrating the 25 mils of phenylhydrazine solution; the difference multiplied by 0.053, gives the weight of the Benzaldehyde present.

AVERAGE DOSE—Metric, 0.03 mil—Apothecaries, ½ minim.

BENZINUM PURIFICATUM

Purified Petroleum Benzin

Benzin. Purif.—Petroleum Ether

A purified distillate from American petroleum consisting of hydrocarbons, chiefly of the marsh-gas series. Preserve it carefully in well-closed containers, in a cool place, remote from fire.

Purified Petroleum Benzin is a clear, colorless, non-fluorescent, volatile liquid, of an ethereal or faint, petroleum-like odor, and having a neutral reaction. It is highly inflammable and its vapor, when mixed with air and ignited, explodes violently.

It is practically insoluble in water; freely soluble in alcohol, and miscible with ether, chloroform, benzene, volatile oils, and fixed oils, with the exception of castor oil.

Specific gravity: 0.638 to 0.660 at 25° C.

It distils completely between 40° and 80° C.

Evaporate 10 mils of Purified Petroleum Benzin from a piece of clean filter paper; no greasy stain remains, and the odor is not disagreeable nor notably sulphuretted. Not more than 0.0015 Gm. of residue remains on evaporating 50 mils of Purified Petroleum Benzin at a temperature not exceeding 40° C.

Boil 10 mils of Purified Petroleum Benzin for a few minutes with one-fourth its volume of an alcoholic solution of ammonia (1 in 10) and a few drops of silver nitrate T.S.; the liquid does not turn brown (*pyrogenous products and sulphur compounds*).

Add 5 drops of Purified Petroleum Benzin to a mixture of 40 drops of sulphuric acid and 10 drops of nitric acid in a test tube, warm the liquid for about ten minutes, set it aside for half an hour, and dilute it in a shallow dish with water; no odor of nitrobenzene is evolved (*benzene*).

BENZOINUM

Benzoin

Benzoin.—Gum Benjamin

A balsamic resin obtained from *Styrax Benzoin* Dryander and some other species of *Styrax* (Fam. *Styracaceæ*) growing in the East Indies and known in commerce as Sumatra Benzoin and Siam Benzoin.

Sumatra Benzoin—In blocks or lumps of varying size, made up of tears, compacted together with a reddish-brown, reddish-gray, or grayish-brown resinous mass; tears externally yellowish or rusty-brown, milky-white on fresh fracture; hard and brittle at ordinary temperatures, but softened by heat and becoming gritty on chewing; odor aromatic and upon digesting with boiling water suggesting the odor of cinnamic acid or storax; taste aromatic and slightly acrid.

Heat a few fragments of Sumatra Benzoin in a test tube; a sublimate is formed consisting of plates and small, rod-like crystals that strongly polarize light.

Add carefully an ethereal solution of Sumatra Benzoin to a small quantity of sulphuric acid contained in a porcelain dish; the solution is colored a brownish-red. Not less than 75 per cent. of Sumatra Benzoin dissolves in alcohol; the alcoholic solution, upon the addition of water, becomes milky and is acid to litmus.

Sumatra Benzoin does not yield more than 2.5 per cent. of ash.

Siam Benzoin—In pebble-like tears of variable size, compressed, yellowish-brown to rusty-brown externally, milky-white on fracture, separate or very slightly agglutinated; hard and brittle at ordinary temperatures but softened by heat and becoming plastic on chewing; odor agreeable, balsamic, vanilla-like; taste slightly acrid.

Heat a few fragments of Siam Benzoin in a test tube; a sublimate is formed directly above the melted mass consisting of numerous long, rod-shaped crystals, which do not strongly polarize light.

Add carefully an ethereal solution of Siam Benzoin to a small quantity of sulphuric acid contained in a porcelain dish; the solution is colored purplish-red. Not less than 90 per cent. of Siam Benzoin dissolves in alcohol; the alcoholic solution upon the addition of water becomes milky and is acid to litmus.

Siam Benzoin does not yield more than 2 per cent. of ash.

The tests which follow apply to Sumatra and Siam Benzoin:

Heat gently 1 to 2 Gm. of Benzoin with 15 mils of purified petroleum benzin, and, after cooling, transfer the supernatant liquid to a separatory funnel, wash once with 10 mils of saturated sodium bicarbonate solution and then with water until free from bicarbonate; on the addition of 20 mils of a copper acetate solution (1 in 200) and vigorously shaking the mixture no green color is noticeable in the petroleum benzin layer *(rosin and foreign resins)*.

Treat about 1 Gm. of powdered Benzoin with 15 mils of warm carbon disulphide, filter the solution, wash the filter with an additional 5 mils of carbon disulphide and allow the mixed liquids to evaporate spontaneously; not less than 12.5 per cent. of residue remains, which corresponds to the tests for identity under *Acidum Benzoicum.*

Preparations—Adeps Benzoinatus Tinctura Benzoini Tinctura Benzoini Composita.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

BENZOSULPHINIDUM

Benzosulphinide

Benzosulphinid.—Saccharin Glusidum

The anhydride [$C_7H_5O_3NS$ or $C_6H_4SO_2.CONH = 183.12$] of orthosulphamide-benzoic acid.

Benzosulphinide occurs as white crystals or as a white, crystalline powder; odorless, or having a faint, aromatic odor; its solutions have an intensely sweet taste.

One Gm. of Benzosulphinide dissolves in 290 mils of water and in 31 mils of alcohol at 25° C.; also in about 25 mils of boiling water; slightly soluble in chloroform or ether. It is easily dissolved by ammonia water, by alkali hydroxide solutions, also by a solution of sodium bicarbonate, with the evolution of carbon dioxide.

A saturated aqueous solution of Benzosulphinide is acid to litmus.

It melts between 219° and 222° C.

When Benzosulphinide is fused at a low temperature with about 5 times its weight of sodium hydroxide, ammonia vapors are evolved; continue the heating until the evolution of ammonia has ceased, treat the residue with 10 mils of distilled water, neutralize the solution with diluted hydrochloric acid, and filter; the filtrate becomes violet on the addition of a drop of ferric chloride T.S.

Incinerate about 1 Gm. of Benzosulphinide; not more than 0.5 per cent. of ash remains.

A solution of 0.2 Gm. of Benzosulphinide in 10 mils of sulphuric acid kept at a temperature of from 48° to 50° C., on a water bath, develops not more than a brown color within ten minutes *(carbonizable impurities)*.

A solution of about 0.2 Gm. of Benzosulphinide in 5 mils of potassium hydroxide T.S. remains clear, and, when mixed with 5 mils of alkaline cupric tartrate V.S., does not deposit cuprous oxide on heating *(glucose, milk-sugar)*.

Add ferric chloride T.S., drop by drop, to 10 mils of a hot, saturated aqueous solution of Benzosulphinide; no precipitate nor violet color appears *(benzoic or salicylic acid)*.

An aqueous solution of Benzosulphinide (1 in 10,000) has a distinctly sweet taste, comparable with that of an aqueous solution of sugar (1 in 20).

No odor of ammonia is noticeable on warming about 0.5 Gm. of Benzosulphinide with about 1 Gm. of magnesia and 10 mils of distilled water (*ammonium compounds*).

AVERAGE DOSE—Metric, 0.2 Gm.—Apothecaries, 3 grains.

BETAEUCAINÆ HYDROCHLORIDUM

Betaeucaine Hydrochloride

Betaeucain. Hydrochl.—Eucaine Chloride Eucaine

A synthetic derivative of piperidine, containing, when dried to constant weight at 100° C., not less than 99 per cent. of the hydrochloride of 2, 6, 6-trimethyl-4 benzoyl-oxy-piperidine [$C_{15}H_{21}O_2NHCl$ or $C_5H_7N(CH_3)_3O(C_6H_5CO)HCl = 283.65$].

Betaeucaine Hydrochloride occurs as a white, crystalline powder; odorless. It is permanent in the air.

One Gm. of Betaeucaine Hydrochloride is soluble in 30 mils of water, 35 mils of alcohol and 6 mils of chloroform at 25° C.; it is more soluble in boiling water and boiling alcohol.

Its saturated aqueous solution is neutral to litmus.

Silver nitrate T.S. produces in an aqueous solution of the salt (1 in 100) a white precipitate, insoluble in nitric acid.

About 0.1 Gm. of Betaeucaine Hydrochloride dissolved in 20 mils of distilled water yields with one drop of ammonia water a white precipitate, which dissolves on agitation. On now adding three more drops of ammonia water to this solution, a white precipitate is again produced, which is dissolved on the addition of an equal volume of distilled water. The further addition of ammonia water again produces a precipitate, which dissolves on adding 10 mils of distilled water, but this solution is not affected by the further addition of ammonia water.

Separate portions of 10 mils each of a saturated aqueous solution of the salt yield a white, curdy precipitate on the addition of a few drops of mercuric chloride T.S., and a yellow, curdy precipitate on the addition of a few drops of a mixture of equal volumes of potassium chromate T.S. and diluted sulphuric acid.

No color is produced when 0.1 Gm. of Betaeucaine Hydrochloride is dissolved in 1 mil of sulphuric acid (*readily carbonizable impurities*).

Five mils of an aqueous solution of the salt (1 in 100) gives no permanent precipitate on the addition of 5 mils of mercuric chloride T.S. (*cocaine and alphaeucaine*).

No weighable ash remains on incinerating 0.5 Gm. of Betaeucaine Hydrochloride.

Assay—Dissolve about 0.5 Gm. of Betaeucaine Hydrochloride, previously dried to constant weight at 100° C. and accurately weighed, in 100 mils of alcohol, which must be previously neutralized with tenth-normal potassium hydroxide V.S., using phenolphthalein T.S. as indicator, and titrate this alcoholic solution with tenth-normal potassium hydroxide V.S. until the pink color is restored. It shows, in the dried salt, not less than 99 per cent. of $C_{15}H_{21}O_2NHCl$.

Each mil of tenth-normal potassium hydroxide V.S. used corresponds to 0.028365 Gm. of $C_{15}H_{21}O_2NHCl$. Each gramme of Betaeucaine Hydrochloride, previously dried, corresponds to not less than 34.9 mils of tenth-normal potassium hydroxide V.S.

BETANAPHTHOL

Betanaphthol

Betanaph.—Naphthol

A monohydroxyphenol [$C_{10}H_7OH = 144.06$] of the naphthalene series. Preserve it in well-closed containers protected from light.

Betanaphthol occurs in colorless or pale buff-colored, shining crystalline laminæ, or as a white or yellowish-white, crystalline powder, having a faint, phenol-like odor and a pungent taste. Permanent in the air.

One Gm. of Betanaphthol dissolves in about 1000 mils of water, 0.8 mil of alcohol, 17 mils of chloroform and in 1.3 mils of ether at 25° C.; also in 80 mils of boiling water; soluble in glycerin and olive oil and easily dissolved by alkali hydroxide solutions.

A hot, saturated aqueous solution of Betanaphthol is neutral to litmus.

Betanaphthol melts between 120° and 122° C.

Betanaphthol sublimes readily when heated and volatilizes with the vapors of alcohol or water.

A cold, saturated aqueous solution of Betanaphthol, when mixed with ammonia water, exhibits a faint, bluish fluorescence.

Add about 0.1 Gm. of Betanaphthol to 5 mils of an aqueous solution of potassium hydroxide (1 in 4), then add 1 mil of chloroform, and gently warm the mixture; the aqueous layer acquires a blue color, changing afterwards to green and brown.

Ferric chloride T.S. colors a cold, saturated aqueous solution of Betanaphthol greenish, and after some time causes the separation of whitish flakes, which turn brown upon the application of heat.

Incinerate about 2 Gm. of Betanaphthol; not more than 0.05 per cent. of ash remains.

Dissolve 0.5 Gm. of Betanaphthol in 25 mils of ammonia water; no residue remains (*naphthalene*), and the solution does not have a deeper color than pale yellow (*other organic impurities*).

A cold, saturated aqueous solution of Betanaphthol, on the addition of a few drops of iodine T.S., followed by sodium hydroxide T.S. in excess, shows no violet color (*alphanaphthol*).

AVERAGE DOSE—Metric, 0.25 Gm.—Apothecaries, 4 grains.

BISMUTHI BETANAPHTHOLAS

Bismuth Betanaphthol

Bism. Betanaph.

A compound of bismuth and betanaphthol of somewhat varying composition, yielding not less than 15 per cent. of betanaphthol [$C_{10}H_7OH$] and, upon ignition, not less than 73 per cent. nor more than 78 per cent. of bismuth oxide [Bi_2O_3].

Bismuth Betanaphthol is a buff-colored to grayish-brown, amorphous powder; odorless or having a faint odor of betanaphthol; tasteless; permanent in the air.

Bismuth Betanaphthol is nearly insoluble in water, alcohol, chloroform or ether; partially dissolved by mineral acids with the formation of the corresponding bismuth salts and the liberation of betanaphthol.

When strongly heated Bismuth Betanaphthol chars and finally leaves a grayish-yellow residue, which is blackened by hydrogen sulphide T.S.

Shake about 1 Gm. of Bismuth Betanaphthol, accurately weighed, with 20 mils of chloroform, filter the mixture, allow the filtrate to evaporate spontaneously and dry the residue in a desiccator over sulphuric acid; the weight of this residue does not exceed 1 per cent. (*free betanaphthol*).

Shake about 0.5 Gm. of Bismuth Betanaphthol with 10 mils of distilled water and filter; the filtrate is colorless and neutral to litmus.

Heat gently a mixture of about 0.2 Gm. of Bismuth Betanaphthol with 5 mils of potassium hydroxide T.S. and about 0.2 Gm. of aluminum wire; the vapors evolved do not turn red litmus blue (*nitrates*).

Incinerate about 2 Gm. of Bismuth Betanaphthol in a porcelain crucible, cool the residue and add just sufficient nitric acid to form a solution with the aid of heat. This solution, when poured into 100 mils of distilled water, produces a white, crystalline precipitate. Now filter the mixture, evaporate the filtrate to 30 mils and again filter if not clear; the clear filtrate does not respond to the tests for *lead, copper, sulphate, or silver* given under *Bismuthi Subcarbonas*.

The bismuth oxide obtained in the following assay does not respond to Bettendorf's Test for arsenic (see Part II, Test No. 2).

Assay for Betanaphthol—Dissolve about 2 Gm. of Bismuth Betanaphthol, accurately weighed, in 20 mils of hydrochloric acid with the aid of heat, cool the liquid and then shake it in a separator with successive portions of chloroform until the extraction of the betanaphthol is complete. Combine the chloroform solutions, allow the liquid to evaporate spontaneously and dry the residue in a desiccator; the weight of the residue corresponds to not less than 15 per cent. of the weight of Bismuth Betanaphthol taken. This residue, crystallized from a solution in boiling distilled water, responds to the tests for identity under *Betanaphthol*.

Assay for Bismuth Oxide—Incinerate about 2 Gm. of Bismuth Betanaphthol, accurately weighed, in a porcelain crucible, cool the residue and dissolve it in nitric acid. Evaporate the solution to dryness and carefully ignite the residue until of constant weight; the bismuth oxide (Bi_2O_3) so obtained corresponds to not less than 73 per cent. nor more than 78 per cent. of the original weight of the Bismuth Betanaphthol taken.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

BISMUTHI ET AMMONII CITRAS

Bismuth and Ammonium Citrate

Bism. et Ammon. Cit.—Bismuth Ammonio-Citrate

Bismuth citrate rendered soluble by the presence of ammonium citrate; when dried to constant weight in a desiccator over sulphuric acid, it yields, upon ignition, not less than 46 per cent. nor more than 52 per cent. of bismuth oxide [Bi_2O_3]. Preserve it in well-closed containers protected from light.

Bismuth and Ammonium Citrate occurs in shining, pearly or translucent scales, or white powder, becoming opaque with loss of ammonia on exposure to the air; it is odorless and has a metallic taste.

Bismuth and Ammonium Citrate is very soluble in water and sparingly soluble in alcohol.

When strongly heated, the Bismuth and Ammonium Citrate fuses and finally leaves a blackened residue, having a yellow surface. A solution of this residue in a slight excess of nitric or hydrochloric acid produces a white turbidity when added to 25 volumes of distilled water.

An aqueous solution of Bismuth and Ammonium Citrate (1 in 20) is neutral or faintly acid to litmus.

Ammonia is evolved when Bismuth and Ammonium Citrate is boiled with a slight excess of sodium hydroxide T.S.

An aqueous solution of the Bismuth and Ammonium Citrate, when treated with an excess of hydrogen sulphide, yields a black precipitate. The filtrate from the latter, when deprived by heat of the excess of hydrogen sulphide and boiled with an excess of lime water, yields a white precipitate.

Dissolve about 0.05 Gm. of Bismuth and Ammonium Citrate in 1 mil of distilled water, in a test tube, add 5 mils of sulphuric acid (free from nitrous compounds), cool the mixture and carefully pour over it 5 mils of ferrous sulphate T.S. without mixing; no red or brown zone appears immediately (*nitrate*).

Dissolve 1 Gm. of Bismuth and Ammonium Citrate in 50 mils of distilled water, precipitate the bismuth completely with hydrogen sulphide, filter, evaporate the filtrate to dryness and ignite. The weight of the residue does not exceed 0.005 Gm. (*alkalies or alkali earths*).

Ignite 3 Gm. of the Bismuth and Ammonium Citrate, dissolve the residue in just a sufficient quantity of warm nitric acid, and pour the solution into 100 mils of distilled water; a white precipitate is produced. Filter this mixture, evaporate the filtrate on a water bath to 30 mils, again filter the liquid and divide the new filtrate into portions of 5 mils each. These portions do not respond to the tests for *lead, copper, sulphate, or silver* given under *Bismuthi Subcarbonas.*

The residue resulting from the ignition and subsequent treatment of 2 Gm. of Bismuth and Ammonium Citrate, as described in the following test, does not respond to Bettendorf's Test for arsenic (see Part II, Test No. 2).

Assay—Take about 1 Gm. of Bismuth and Ammonium Citrate, previously dried to constant weight in a desiccator over sulphuric acid, and weigh accurately. Ignite it in a porcelain crucible and, after cooling, add 5 mils of nitric acid to the residue, drop by drop, warming until solution is effected. Evaporate this solution to dryness, and carefully ignite it at red heat. It leaves a residue of bismuth oxide (Bi_2O_3) corresponding to not less than 46 per cent. nor more than 52 per cent. of the original weight of Bismuth and Ammonium Citrate taken.

AVERAGE DOSE—Metric, 0.125 Gm.—Apothecaries, 2 grains.

BISMUTHI SUBCARBONAS

Bismuth Subcarbonate

Bism. Subcarb.

A basic bismuth carbonate of varying chemical composition, which, when dried to constant weight at 100° C., yields, upon ignition, not less than 90 per cent. of bismuth oxide [Bi_2O_3].

Bismuth Subcarbonate is a white or pale yellowish-white powder; odorless and tasteless, and permanent in the air.

Bismuth Subcarbonate is insoluble in water or alcohol; completely dissolved by nitric or hydrochloric acid with copious effervescence.

Its solution in a slight excess of nitric acid, when added to 25 volumes of distilled water, produces a white turbidity.

When heated to redness, the salt loses water and carbon dioxide, and leaves a yellowish residue, which is soluble in nitric or hydrochloric acid and blackened by hydrogen sulphide T.S.

Dissolve 1 Gm. of the salt in 2 mils of nitric acid, add distilled water to make the solution measure 25 mils, then add 0.35 mil of tenth-normal silver nitrate V.S. and remove the precipitate, if any, by filtration; the clear filtrate remains unaffected by the further addition of a few drops of silver nitrate T.S. (*chloride*).

Dissolve 3 Gm. of the salt in just a sufficient quantity (about 4 mils) of warm nitric acid, and pour the solution into 100 mils of distilled water; a white precipitate is produced. Filter, and evaporate the filtrate on a water bath to 30 mils, again filter the liquid, divide the latter filtrate into portions of 5 mils each and subject these several portions to the following tests:

Mix one portion with an equal volume of diluted sulphuric acid; it does not become cloudy (*lead*).

Precipitate another portion with a slight excess of ammonia water; the supernatant liquid does not exhibit a bluish tint (*copper*).

Another portion is not immediately affected by barium nitrate T.S. (*sulphate*). In another portion hydrochloric acid does not produce a precipitate which is insoluble in a slight excess of hydrochloric acid, but soluble in ammonia water (*silver*).

Boil 1 Gm. of the salt with 20 mils of a mixture of equal parts of acetic acid and distilled water, cool the solution and filter. Free the filtrate from bismuth by the addition of hydrogen sulphide, boil the mixture and again filter. The latter filtrate leaves not more than 0.003 Gm. of residue on evaporation and gentle ignition (*alkalies or alkali earths*).

Agitate about 0.05 Gm. of Bismuth Subcarbonate with 5 mils of a solution of equal parts of distilled water and ferrous sulphate T.S., and cautiously pour the mixture over 5 mils of sulphuric acid (free from nitrous compounds), so as to form a layer above; no brownish-red zone forms at the line of contact of the two liquids (*nitrate*).

The residue resulting from the ignition of 2 Gm. of Bismuth Subcarbonate does not respond to Bettendorf's Test for arsenic (see Part II, Test No. 2).

Assay—Ignite thoroughly at red heat in a porcelain crucible about 1 Gm. of Bismuth Subcarbonate, previously dried to constant weight at 100° C. and accurately weighed. The residue of bismuth oxide (Bi_2O_3) corresponds to not less than 90 per cent. of the original weight of Bismuth Subcarbonate taken.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

BISMUTHI SUBGALLAS

Bismuth Subgallate

Bism. Subgal.—Dermatol

A basic bismuth gallate of varying chemical composition which, when dried to constant weight at 100° C., yields, upon ignition, not less than 52 per cent. nor more than 57 per cent. of bismuth oxide [Bi_2O_3].

Bismuth Subgallate is an amorphous, bright yellow powder, odorless; tasteless, and permanent in the air.

Bismuth Subgallate is insoluble in water, alcohol, or ether; readily soluble, with decomposition, in warm hydrochloric, nitric or sulphuric acid; insoluble in very dilute mineral acids; readily soluble in alkali hydroxide solutions, forming a clear, yellow solution which rapidly changes to a deep red.

When heated to redness it at first chars, leaving finally a yellow residue, which is blackened by hydrogen sulphide T.S. A solution of this residue in a slight excess of warm nitric or hydrochloric acid produces a white turbidity when added to 25 volumes of distilled water.

Agitate thoroughly about 0.1 Gm. of Bismuth Subgallate with an excess of hydrogen sulphide T.S.; a brownish-black precipitate results. Filter this mixture, boil the filtrate to remove the dissolved gas, and then cool; the addition of 1 drop of ferric chloride T.S. produces a blue-black coloration in the liquid.

Shake 1 Gm. of the salt with 20 mils of alcohol for one minute, filter and evaporate the filtrate to dryness on a water bath; not more than 0.005 Gm. of residue remains (*free gallic acid*).

Boil 1 Gm. of Bismuth Subgallate with 20 mils of a mixture of equal parts of acetic acid and distilled water, cool the solution and filter. Free the filtrate from bismuth by the addition of hydrogen sulphide, boil the mixture and again filter. The latter filtrate leaves not more than 0.005 Gm. of residue on evaporation and gentle ignition (*alkalies or alkali earths*).

Mix thoroughly about 0.05 Gm. of Bismuth Subgallate with 5 mils of diluted sulphuric acid and 5 mils of ferrous sulphate T.S., filter the mixture and then cautiously pour the filtrate, without mixing, over 5 mils of sulphuric acid (free from nitrous compounds), contained in a test tube; no brownish-red zone forms immediately (*nitrate*).

Ignite 3 Gm. of Bismuth Subgallate in a porcelain crucible, cool and cautiously add just sufficient nitric acid, drop by drop, warming until the residue is dissolved. Evaporate the solution to dryness, again ignite and cool. Cautiously dissolve this residue in just sufficient nitric acid by the aid of gentle heat, concentrate the solution to about 4 mils, pour it into 100 mils of distilled water, filter, evaporate the filtrate on a water bath to 30 mils, again filter and divide this filtrate into portions of 5 mils each. These portions do not respond to the tests for *lead, copper, sulphate, or silver* given under *Bismuthi Subcarbonas*.

The residue resulting from the ignition and subsequent treatment of 2 Gm. of Bismuth Subgallate as described in the following test does not respond to Bettendorf's Test for arsenic (see Part II, Test No. 2).

Assay—Take about 1 Gm. of Bismuth Subgallate, previously dried to constant weight at 100° C., and weigh accurately. Ignite in a porcelain crucible and, after cooling, add 5 mils of nitric acid to the residue, drop by drop, warming until complete solution has been effected. Evaporate this solution to dryness and carefully ignite at red heat; it leaves a residue of bismuth oxide (Bi_2O_3) corresponding to not less than 52 per cent. nor more than 57 per cent. of the original weight of Bismuth Subgallate taken.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

BISMUTHI SUBNITRAS

Bismuth Subnitrate

Bism. Subnit.

A basic bismuth nitrate of varying chemical composition, which, when dried for twenty-four hours in a desiccator over sulphuric acid, yields, upon ignition, not less than 79 per cent. of bismuth oxide [Bi_2O_3].

Bismuth Subnitrate is a white powder; odorless, almost tasteless, and slightly hygroscopic.

Bismuth Subnitrate is almost insoluble in water, insoluble in alcohol, and readily dissolved by hydrochloric or nitric acid.

Its solution in a slight excess of warm nitric or hydrochloric acid produces a white turbidity when added to 25 volumes of distilled water.

When heated to redness it evolves nitrous vapors, leaving a yellow residue, which is blackened by hydrogen sulphide T.S.

When brought in contact with moistened blue litmus paper, the salt shows a slightly acid reaction.

Boil 1 Gm. of Bismuth Subnitrate with 20 mils of a mixture of equal parts of acetic acid and distilled water, cool the solution and filter. Free the filtrate from bismuth by the addition of hydrogen sulphide, boil the mixture and again filter. The latter filtrate leaves not more than 0.003 Gm. of residue on evaporation and gentle ignition (*alkalies or alkali earths*).

Boil about 0.1 Gm. of the salt with 5 mils of potassium hydroxide T.S.; no odor of ammonia is perceptible nor does the vapor turn moistened red litmus paper blue.

The residue resulting from the ignition of 2 Gm. of the salt does not respond to Bettendorf's Test for arsenic (see Part II, Test No. 2).

Add 3 Gm. of the salt to 3 mils of warm nitric acid; no effervescence occurs (*carbonate*), and no residue remains (*insoluble foreign salts*). Pour this solution into 100 mils of distilled water, a white precipitate is produced. Filter, evaporate the filtrate on a water bath to 30 mils, again filter the liquid and divide the new filtrate into portions of 5 mils each. These portions do not respond to the tests for *lead, copper, sulphate, or silver* given under *Bismuthi Subcarbonas.*

Assay—Ignite thoroughly at red heat in a porcelain crucible about 1 Gm. of Bismuth Subnitrate, previously dried for twenty-four hours in a desiccator over sulphuric acid and accurately weighed. The residue of bismuth oxide (Bi_2O_3) corresponds to not less than 79 per cent. of the original weight of Bismuth Subnitrate taken.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

BISMUTHI SUBSALICYLAS

Bismuth Subsalicylate

Bism. Subsalicyl.

A basic bismuth salicylate of varying chemical composition, which, when dried to constant weight at 100° C., yields, upon ignition, not less than 62 per cent. nor more than 66 per cent. of bismuth oxide [Bi_2O_3]. Protect it from light.

Bismuth Subsalicylate is a white, or nearly white, amorphous or crystalline powder; odorless, tasteless, and permanent in the air.

Bismuth Subsalicylate is almost insoluble in cold water; upon prolonged boiling with water a portion of the salicylic acid passes into solution with the formation of a more basic bismuth subsalicylate. It is partly soluble, with decomposition, in hydrochloric or nitric acid, a white, flocculent precipitate of salicylic acid separating.

When heated to redness it at first chars, finally leaving a yellow residue, which is blackened by hydrogen sulphide. A solution of this residue in a slight excess of warm nitric or hydrochloric acid produces a white, turbidity when added to 25 volumes of distilled water.

Agitate about 0.1 Gm. of Bismuth Subsalicylate with a solution of 5 drops of ferric chloride T.S. in 10 mils of distilled water; a deep violet-blue coloration is produced.

Agitate 1 Gm. of the salt with 20 mils of chloroform, filter the liquid and evaporate the filtrate to dryness; not more than 0.005 Gm. of residue remains (*free salicylic acid*).

Ignite 3 Gm. of Bismuth Subsalicylate in a porcelain crucible, cool and cautiously add just sufficient nitric acid to the residue, drop by drop, warming until it is dissolved. Pour this solution into 100 mils of distilled water, filter, evaporate the filtrate on a water bath to 30 mils, again filter and divide the filtrate into portions of 5 mils each. These portions do not respond to the tests for *lead, copper, sulphate, or silver* given under *Bismuthi Subcarbonas*.

Boil 1 Gm. of Bismuth Subsalicylate with 20 mils of a mixture of equal parts of acetic acid and distilled water, cool the solution and filter. Free the filtrate from bismuth by the addition of hydrogen sulphide, boil the mixture and again filter. The latter filtrate, on evaporation and ignition, leaves not more than 0.005 Gm. of residue (*alkalies or alkali earths*).

Triturate about 0.05 Gm. of Bismuth Subsalicylate with 0.1 Gm. of sodium salicylate and 5 mils of distilled water, and carefully pour it without mixing over 5 mils of sulphuric acid (free from nitrous compounds) contained in a test tube; no pink to brownish-red zone forms immediately (*nitrate*).

The residue resulting from the ignition and subsequent treatment of 2 Gm. of Bismuth Subsalicylate, as described in the test below, does not respond to Bettendorf's Test for arsenic (see Part II, Test No. 2).

Assay—Take about 1 Gm. of Bismuth Subsalicylate, previously dried to constant weight at 100° C., and weigh accurately. Ignite in a porcelain crucible, and, after cooling, add 5 mils of nitric acid to the residue, drop by drop, warming until solution has been effected. Evaporate this solution to dryness and carefully ignite it at red heat. It leaves a residue of bismuth oxide (Bi_2O_3) corresponding to not less than 62 per cent. nor more than 66 per cent. of the original weight of Bismuth Subsalicylate taken.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

BROMOFORMUM

Bromoform

Bromof.

A liquid consisting of about 96 per cent., by weight, of $CHBr_3$ (252.77) and about 4 per cent. of dehydrated alcohol. Preserve it in glass-stoppered bottles, in a cool place, protected from light.

Bromoform is a heavy, transparent, colorless, mobile liquid, with an ethereal odor, and a penetrating, sweet taste, resembling that of chloroform.

Bromoform is slightly soluble in water; miscible with alcohol, chloroform, ether, benzene, petroleum benzin or fixed or volatile oils.

Specific gravity: 2.595 to 2.620 at 25° C.

Bromoform is slightly volatile at ordinary temperatures.

Bromoform is not inflammable, but when vaporized by the application of heat, its vapors may be ignited.

Evaporate 10 mils of Bromoform from a porcelain dish on a water bath; not more than 0.006 Gm. of residue remains after drying it at 100° C.

Shake 10 mils of Bromoform with 10 mils of distilled water, and allow the liquids to separate completely. The water removed from the layer of Bromoform is neutral to litmus (*free acid*); 5 mil portions, tested separately, show not more than a slight opalescence on the addition of a few drops of silver nitrate T.S. (*bromides or brominated compounds*), and no blue color on the addition of a few drops each of potassium iodide T.S. and of starch T.S. (*free bromine*).

Agitate 10 mils of Bromoform with 10 mils of distilled water, and allow the liquids to separate completely. Remove the aqueous layer from the Bromoform, treat it with an excess of ammonia water, and then with a solution of iodine and ammonium iodide, until the black precipitate of nitrogen iodide, which sometimes forms, slowly disappears; it does not become milky in appearance, due to the separation of iodoform, recognizable by its odor (*acetone*).

AVERAGE DOSE—Metric, 0.2 mil—Apothecaries, 3 minims.

BUCHU

Buchu

The dried leaves of *Barosma betulina* (Thunberg) Bartling and Wendland, known in commerce as Short Buchu; or of *Barosma serratifolia* (Curtis) Willdenow, known in commerce as Long Buchu (Fam. *Rutaceæ*), without the presence or admixture of more than 10 per cent. of stems or other foreign matter.

Short Buchu—Rhomboidally oval or obovate; from 9 to 25 mm. in length and from 4 to 13 mm. in breadth; summit obtuse, and recurved; margin somewhat serrate or finely dentate with an oil gland at the base of each tooth; the base more or less wedge-shaped; color varying from vivid green to yellowish-green, occasionally a few olive-gray leaves; glandular-punctate; both surfaces papillose; under surface longitudinally striate; texture coriaceous; petiole 1 mm. in length; odor and taste characteristic, aromatic and mint-like.

Long Buchu—Linear-lanceolate, from 2.5 to 4 cm. in length and from 4 to 6 mm. in breadth; summit somewhat rounded or truncate with an oil gland at the apex; margin sharply serrate and glandular; otherwise resembling Short Buchu.

Stems in both Short and Long Buchu about 1 mm. in diameter, yellowish-green or brownish-red, cylindrical, longitudinally furrowed, with prominent leaf-scars nearly opposite to each other giving the stems a jointed character.

The yield of ash does not exceed 4 per cent.

Preparation—Fluidextractum Buchu.

AVERAGE DOSE—Metric, 2 Gm.—Apothecaries, 30 grains.

CAFFEINA

Caffeine

Caffein.—Theine

A feebly basic substance [$C_8H_{10}O_2N_4+H_2O$ or $C_5H(CH_3)_3O_2N_4+H_2O$ $=212.14$] obtained from the leaves of *Thea sinensis* Linné (Fam. *Ternstrœmiaceæ*), or from the seeds of *Coffea arabica* Linné (Fam. *Rubiaceæ*); also occurring in some other plants; or prepared synthetically.

Caffeine occurs in white, flexible, silky, glistening needles, usually matted together in fleecy masses; odorless, and having a bitter taste; efflorescent in dry air.

One Gm. of Caffeine dissolves in 46 mils of water, 66 mils of alcohol, 5.5 mils of chloroform and in 530 mils of ether at 25° C.; also in 5.5 mils of water at 80° C. and in 22 mils of alcohol at 60° C.

A saturated aqueous solution of Caffeine is neutral to litmus.

Caffeine, rendered anhydrous, melts between 235° and 237° C.

Dissolve about 0.01 Gm. of Caffeine in 1 mil of hydrochloric acid in a porcelain dish, add 0.1 Gm. of potassium chlorate and evaporate the solution to dryness on a water bath. Invert the dish over a vessel containing a few drops of ammonia water; the residue acquires a purple color, which is destroyed by fixed alkalies.

An aqueous solution of Caffeine yields a precipitate with tannic acid T.S., soluble in an excess of the reagent.

Caffeine loses not more than 9 per cent. of its weight when dried to constant weight at 80° C.

Incinerate about 2 Gm. of Caffeine; not more than 0.05 per cent. of ash remains.

About 0.5 Gm. of Caffeine dissolves in 5 mils of sulphuric or nitric acid without producing more than a faint, yellowish color (*organic impurities*).

Its aqueous solution is not precipitated by mercuric potassium iodide T.S. (*alkaloids*).

Preparations—Caffeina Citrata Caffeina Citrata Effervescens (from Citrated Caffeine).

Average dose—Metric, 0.15 Gm.—Apothecaries, 2½ grains.

CAFFEINA CITRATA

Citrated Caffeine

Caffein. Cit.

Citrated Caffeine contains, when dried to constant weight at 80° C., not less than 48 per cent. of anhydrous caffeine [$C_8H_{10}O_2N_4$ = 194.12].

Caffeine, *fifty grammes*	50 Gm.
Citric Acid, *fifty grammes*	50 Gm.
Distilled Water, hot, *one hundred milliliters*	100 mils

Dissolve the citric acid in the hot distilled water, add the caffeine, and evaporate the resulting solution to dryness on a water bath, constantly stirring toward the end of the operation. Reduce the product to a fine powder and transfer it to well-closed containers.

Citrated Caffeine occurs as a white powder, odorless and having a slightly bitter, acid taste.

Citrated Caffeine gives a clear, syrupy solution with a small quantity of water, but caffeine precipitates on dilution. This precipitate redissolves on the further addition of water.

Its aqueous solution (1 in 30) is acid to litmus.

Dissolve about 0.02 Gm. of Citrated Caffeine in 1 mil of hydrochloric acid in a porcelain dish, add 0.1 Gm. of potassium chlorate, evaporate the mixture on a water bath and invert the dish over a vessel containing a few drops of ammonia water; the residue acquires a purple color, which is destroyed by alkalies.

About 2 mils of a filtered aqueous solution of Citrated Caffeine (1 in 10) mixed with 50 mils of lime water remains clear in the cold, but becomes turbid when heated to boiling.

When dried to constant weight at 80° C. it loses not more than 5 per cent. of its weight.

Incinerate about 1 Gm. of Citrated Caffeine; not more than 0.1 per cent. of ash remains.

Heat a mixture of 0.25 Gm. of Citrated Caffeine and 5 mils of sulphuric acid in a porcelain dish on a water bath for fifteen minutes, protecting it from dust; it may become yellow in color but not brown or black (*tartaric acid*).

An aqueous solution of Citrated Caffeine does not respond to the Test for heavy metals (see Part II, Test No. 3).

The addition of a few drops of barium chloride T.S. to 10 mils of an aqueous solution of Citrated Caffeine (1 in 100), previously treated with a few drops of hydrochloric acid, produces no turbidity (*sulphuric acid*).

Assay—Dissolve about 0.5 Gm. of Citrated Caffeine, previously dried to constant weight at 80° C. and accurately weighed, in 10 mils of hot distilled water, add an excess of sodium hydroxide T.S., cool the solution, and shake it in a separator with three successive portions of 20 mils, 10 mils, and 5 mils, respectively, of chloroform, or more if necessary to complete the extraction. Evaporate the combined chloroform solutions on a water bath and dry the residue to constant weight at 80° C. The weight of anhydrous caffeine ($C_8H_{10}O_2N_4$) so obtained corresponds to not less than 48 per cent. of the weight of Citrated Caffeine taken. This residue, when recrystallized from hot water, and dried to constant weight at 80° C., has the melting point given under *Caffeina*.

Preparation—Caffeina Citrata Effervescens.

Average dose—Metric, 0.3 Gm.—Apothecaries, 5 grains.

CAFFEINA CITRATA EFFERVESCENS

Effervescent Citrated Caffeine

Caff. Cit. Eff.

It contains not less than 1.9 per cent. of anhydrous caffeine [$C_8H_{10}O_2N_4 = 194.12$].

Citrated Caffeine, *forty grammes*	40 Gm.
Sodium Bicarbonate, dried and powdered, *five hundred and seventy grammes*	570 Gm.
Tartaric Acid, dried and powdered, *three hundred grammes*	300 Gm.
Citric Acid, uneffloresced crystals, *one hundred and ninety-five grammes*	195 Gm.
To make about *one thousand grammes*	1000 Gm.

Powder the citric acid and mix it intimately with the citrated caffeine and tartaric acid, then thoroughly incorporate the sodium bicarbonate. Place the mixed powders on a plate of glass or in a suitable dish, in an oven heated to between 93° and 104° C. Manipulate the mixture carefully with a wooden spatula, and, when it has become moist, rub it through a No. 6 tinned-iron sieve, and dry the granules at a temperature not exceeding 54° C. Immediately transfer the product to suitable containers, and seal them tightly. Care must be used to prevent the preparation from coming in contact with air containing moisture.

Assay—Dissolve about 5 Gm. of Effervescent Citrated Caffeine, accurately weighed, in 10 mils of hot distilled water. When effervescence has ceased, add an excess of sodium hydroxide T.S., cool the mixture and shake it in a separator with three successive portions of 20 mils, 10 mils, and 5 mils, respectively, of chloroform, or more if necessary to complete the extraction. Evaporate the combined chloroform solutions on a water bath and dry the residue to constant weight at 80° C. The weight of anhydrous caffeine ($C_8H_{10}O_2N_4$) so obtained corresponds to not less than 1.9 per cent. of the weight of Effervescent Citrated Caffeine taken. This residue, when recrystallized from hot water, responds to the tests for identity and, when dried to constant weight at 80° C., has the melting point given under *Caffeina.*

Average dose—Metric, 4 Gm.—Apothecaries, 1 drachm.

CAFFEINÆ SODIO-BENZOAS

Caffeine Sodio-Benzoate

Caff. Sod. Benz.

A mixture of caffeine and sodium benzoate. It contains, when dried to constant weight at 80° C., not less than 46 per cent. nor more than 50 per cent. of anhydrous caffeine [$C_8H_{10}O_2N_4 = 194.12$], the remainder being sodium benzoate [$NaC_7H_5O_2 = 144.04$]. Preserve it in well-closed containers.

Caffeine Sodio-Benzoate occurs as a white powder; it is odorless and has a slightly bitter taste.

One Gm. of Caffeine Sodio-Benzoate dissolves in 1.1 mils of water, some caffeine separating on standing, and in 30 mils of alcohol, at 25° C.; partly soluble in chloroform.

An aqueous solution (1 in 20) may be neutral, slightly acid, or slightly alkaline to litmus, but is not reddened by phenolphthalein T.S.

On heating the compound, it is decomposed with the evolution of white vapors, leaving a carbonaceous residue which effervesces with acids and colors a non-luminous flame intensely yellow.

Ferric chloride T.S. produces a salmon-colored precipitate in an aqueous solution of the compound. The addition of diluted hydrochloric acid produces a white precipitate of benzoic acid.

About 0.1 Gm. of Caffeine Sodio-Benzoate dissolves in 2 mils of sulphuric acid without producing more than a slight, yellow color (*readily carbonizable organic matter*).

An aqueous solution (1 in 50), acidulated with hydrochloric acid and filtered, does not respond to the Test for heavy metals (see Part II, Test No. 3).

When dried to constant weight at 80° C., it loses not more than 5 per cent. of its weight.

Assay for Caffeine—Dissolve about 1 Gm. of Caffeine Sodio-Benzoate, previously dried to constant weight at 80° C. and accurately weighed, in 5 mils of distilled water in a separator, add 5 mils of sodium hydroxide T.S. and shake the mixture with four successive portions of 20 mils, 10 mils, 10 mils, and 5 mils, respectively, of chloroform. Evaporate the combined chloroform solutions on a water bath and dry the residue to constant weight at 80° C. The weight of anhydrous caffeine ($C_8H_{10}O_2N_4$) so obtained corresponds to not less than 46 per cent. nor more than 50 per cent. of the weight of dried Caffeine Sodio-Benzoate taken.

This residue, when recrystallized from hot water, responds to the tests of identity and, when dried to constant weight at 80° C., has the melting point given under *Caffeina.*

Assay for Sodium Benzoate—When dried to constant weight at 80° C. and estimated as directed under the Assay for alkali salts of organic acids (see Part II, Test No. 6) it shows, in the dried mixture, not less than 50 per cent. nor more than 54 per cent. of sodium benzoate ($NaC_7H_5O_2$).

	Metric	Apothecaries
Average dose—By mouth,	0.3 Gm.—	5 grains.
Hypodermic,	0.2 Gm.—	3 grains.

CALCII BROMIDUM

Calcium Bromide

Calc. Brom.

A hydrated form of Calcium Bromide containing not less than 84 per cent. of $CaBr_2$ (199.91). Preserve it in well-closed containers.

Calcium Bromide is a white, granular salt; odorless, of a sharp, saline taste, and very deliquescent.

One Gm. of Calcium Bromide dissolves in 0.7 mil of water and in 1.3 mils of alcohol at 25° C.; also in 0.4 mil of boiling water; insoluble in chloroform or ether.

An aqueous solution of the salt (1 in 20) is neutral or slightly alkaline to litmus.

An aqueous solution of the salt (1 in 20) yields with ammonium oxalate T.S. a white precipitate, insoluble in acetic acid but soluble in hydrochloric acid.

Silver nitrate T.S. added to an aqueous solution of the salt (1 in 10) produces a yellowish-white precipitate, insoluble in nitric acid or in a moderate excess of ammonia water.

Add 1 mil of chloroform to 10 mils of an aqueous solution of the salt (1 in 20) and cautiously introduce chlorine water, which has been diluted with an equal volume of distilled water, drop by drop, with constant agitation. The liberated bromine dissolves in the chloroform and imparts to it a yellow to orange color, which is free from any violet tint (*iodide*).

Drop 1 mil of diluted sulphuric acid upon about 1 Gm. of the powdered salt; no yellow color appears at once (*bromate*).

Dissolve about 0.1 Gm. of the salt in 5 mils of distilled water, add an excess of silver nitrate T.S. and a few drops of nitric acid, filter, wash the precipitate with distilled water, digest it for ten minutes with 5 mils of ammonium carbonate T.S. and filter. On supersaturating the filtrate with nitric acid not more than a slight turbidity is produced at once (*chlorides*).

Twenty mils of an aqueous solution (1 in 250) does not at once assume a blue color with potassium ferrocyanide T.S. (*iron*).

Five mils of an aqueous solution (1 in 20), when acidulated with 1 drop of hydrochloric acid, shows no immediate turbidity with 1 mil of barium chloride T.S. (*sulphate*).

Dissolve 1 Gm. of Calcium Bromide and 1 Gm. of sodium acetate in 5 mils of distilled water and render the solution slightly acid by the addition of a sufficient quantity (from 3 to 5 drops) of diluted acetic acid. After boiling and thoroughly cooling the solution, it does not become cloudy within five minutes after the addition, with agitation, of 5 drops of potassium dichromate T.S. (*barium*).

Precipitate the calcium completely from 10 mils of an aqueous solution of the salt (1 in 20) by adding ammonium oxalate T.S. and filtering. The filtrate on evaporation and ignition leaves not more than 0.004 Gm. of fixed residue (*magnesium and alkalies*).

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

Assay—Proceed as directed under the Assay for bromides (see Part II, Test No. 5), using about 0.4 Gm. of Calcium Bromide, accurately weighed in a stoppered weighing-bottle. It shows not less than 84 per cent. of $CaBr_2$.

Each mil of tenth-normal silver nitrate V.S. used corresponds to 0.0099955 Gm. of $CaBr_2$. Each gramme of Calcium Bromide corresponds to not less than 84.0 mils of tenth-normal silver nitrate V.S.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

CALCII CARBONAS PRÆCIPITATUS

Precipitated Calcium Carbonate

Calc. Carb. Præc.—Precipitated Chalk

It contains, when dried to constant weight at 200° C., not less than 98 per cent. of $CaCO_3$ (100.07).

Precipitated Calcium Carbonate is a fine, white, micro-crystalline powder, without odor or taste, and permanent in the air.

Precipitated Calcium Carbonate is nearly insoluble in water; the solubility is increased by the presence of ammonium salts and especially by carbon dioxide; alkali hydroxides diminish its solubility; insoluble in alcohol; dissolved with effervescence by diluted acetic, hydrochloric, or nitric acid.

When heated to full redness, the salt gradually loses carbon dioxide, and a residue of calcium oxide remains.

For applying tests of identity and purity, mix 1 Gm. of Calcium Carbonate with 50 mils of distilled water, and add hydrochloric acid, drop by drop, with agitation, until solution takes place. The resulting solution, after boiling and cooling, should be acid, and should not impart a green or crimson color to a non-luminous flame, nor leave more than 0.002 Gm. of insoluble matter.

Neutralize a portion of this acid solution with ammonia water, and add ammonium oxalate T.S.; a white precipitate is produced which is insoluble in acetic acid, but soluble in hydrochloric acid.

Another portion of the solution, as prepared above, does not respond to the Test for heavy metals (see Part II, Test No. 3).

Agitate 1 Gm. of the salt with 50 mils of distilled water, which has previously been boiled and cooled, and then filter; the filtrate is not alkaline to litmus, and, on evaporation, leaves not more than 0.005 Gm. of residue (*soluble impurities*).

Assay—Dissolve about 0.3 to 0.4 Gm. of Calcium Carbonate, previously dried to constant weight at 200° C. and accurately weighed, in 10 mils of distilled water and 10 mils of diluted hydrochloric acid and boil the solution to expel all carbon dioxide. Transfer this solution to a 200 mil graduated flask, add 100 mils of tenth-normal oxalic acid V.S., render it alkaline with ammonia water, shake the mixture well and allow to stand for three hours at from 60° to 70° C. or over night at room temperature. Cool the liquid if necessary, fill the flask with distilled water to the mark, mix it well, filter through a dry filter into a dry flask, reject the first 20 mils of the filtrate, and proceed as follows: Add diluted sulphuric acid to 100 mils of the filtrate (representing one-half of the Calcium Carbonate taken) until of acid reaction, then add 25 mils more of the diluted sulphuric acid, warm the solution to from 60° to 70° C., and titrate with tenth-normal potassium permanganate V.S. It shows, in the dried salt, not less than 98 per cent. of $CaCO_3$.

Each mil of tenth-normal oxalic acid V.S. used corresponds to 0.0050035 Gm. of $CaCO_3$. Each gramme of dried Calcium Carbonate corresponds to not less than 195.9 mils of tenth-normal oxalic acid V.S.

Average dose—Metric, 1 Gm.—Apothecaries, 15 grains.

CALCII CHLORIDUM

Calcium Chloride

Calc. Chlor.

A hydrated form of Calcium Chloride containing not less than 75 per cent. of $CaCl_2$ (110.99). Preserve it in well-stoppered bottles.

Calcium Chloride occurs in white, slightly translucent, hard fragments, granules, or sticks; odorless, having a sharp, saline taste. It is very deliquescent.

One Gm. of Calcium Chloride dissolves in 1.2 mils of water and in about 10 mils of alcohol at 25° C.; also in 0.7 mil of boiling water and about 2 mils of boiling alcohol.

Its aqueous solution (1 in 20) is neutral or slightly alkaline to litmus.

An aqueous solution of the salt (1 in 20) yields, with ammonium oxalate T.S., a white precipitate insoluble in acetic acid, but soluble in hydrochloric acid.

Silver nitrate T.S. added to an aqueous solution of the salt (1 in 10) produces a white precipitate insoluble in nitric acid but readily soluble in ammonia water.

Add ammonia water to an aqueous solution of the salt (1 in 20) until of alkaline reaction; no turbidity or precipitation occurs either before or after boiling (*iron, aluminum, phosphates, etc.*).

Precipitate the calcium completely from 10 mils of an aqueous solution of the salt (1 in 20) by adding ammonium oxalate T.S. and filtering. The filtrate on evaporation and ignition leaves not more than 0.004 Gm. of fixed residue (*magnesium and alkalies*).

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

Assay—Proceed as directed under the Assay for chlorides (see Part II, Test No. 5), using about 0.3 Gm. of Calcium Chloride, accurately weighed in a stoppered weighing-bottle. It shows not less than 75 per cent. of $CaCl_2$.

Each mil of tenth-normal silver nitrate V.S. used corresponds to 0.00555 Gm. of $CaCl_2$. Each gramme of Calcium Chloride corresponds to not less than 135.1 mils of tenth-normal silver nitrate V.S.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

CALCII GLYCEROPHOSPHAS

Calcium Glycerophosphate

Calc. Glycerophos.—Calcium Glycerinophosphate

The normal calcium salt of glycerophosphoric acid [$C_3H_5(OH)_2PO_4H_2 = 172.11$], containing, when dried to constant weight at 130° C., not less than 98 per cent. of $CaC_3H_7PO_6$ or $C_3H_5(OH)_2PO_4Ca$ (210.17). Preserve it in well-closed containers.

Calcium Glycerophosphate occurs as a fine white powder; odorless and almost tasteless, somewhat hygroscopic.

One Gm. of Calcium Glycerophosphate dissolves in about 50 mils of water at 25° C.; soluble in less water at a lower temperature; citric acid increases its solubility; insoluble in alcohol.

A saturated aqueous solution of the salt is alkaline to litmus and to phenolphthalein.

A cold, saturated aqueous solution of the salt yields white, iridescent scales of anhydrous calcium glycerophosphate when heated to boiling.

When heated above 170° C. the salt is decomposed, evolving inflammable vapors, and at a red heat it is converted into calcium pyrophosphate.

A saturated aqueous solution of the salt yields with ammonium oxalate T.S. a white precipitate, insoluble in acetic acid but soluble in hydrochloric acid. With lead acetate T.S. the saturated solution yields a white curdy precipitate which is soluble in nitric acid.

Dissolve 1 Gm. of Calcium Glycerophosphate in 10 mils of diluted nitric acid and add an equal volume of cold ammonium molybdate T.S.; no precipitate is formed within one hour (*phosphates*) but on heating the mixture a yellow precipitate is formed.

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

Dissolve 0.1 Gm. of the salt in 10 mils of diluted nitric acid and add 1 mil of silver nitrate T.S.; an opalescence but no precipitate may appear within one minute (*chloride*).

Dissolve 0.1 Gm. of the salt in 10 mils of diluted hydrochloric acid and add 1 mil of barium chloride T.S.; no distinct turbidity appears within one minute (*sulphate*).

Shake 1 Gm. of finely powdered Calcium Glycerophosphate with 25 mils of dehydrated alcohol, filter the mixture, evaporate the filtrate on a water bath and dry the residue for an hour at a temperature not exceeding 70° C. The resulting residue weighs not more than 0.01 Gm. (*alcohol-soluble impurities, etc.*).

Dry a portion of the finely powdered salt to constant weight at 130° C.; the loss does not exceed 10 per cent. (*water*).

Assay—Dissolve about 0.4 Gm. of the salt, previously dried to constant weight at 130° C. and accurately weighed, in 20 mils of a 5 per cent. solution of acetic acid and add 30 mils of distilled water. Heat the mixture to boiling and add an excess of ammonium oxalate T.S. Collect the resulting precipitate, wash, dry, and then ignite it until of constant weight. This residue of calcium oxide corresponds to not less than 26.1 per cent. of the weight of Calcium Glycerophosphate taken.

Dry a portion of Calcium Glycerophosphate to constant weight at 130° C., and ignite it to constant weight; the weight of calcium pyrophosphate corresponds to not less than 59.2 per cent. of the weight of Calcium Glycerophosphate taken.

AVERAGE DOSE—Metric, 0.25 Gm.—Apothecaries, 4 grains.

CALCII HYPOPHOSPHIS

Calcium Hypophosphite

Calc. Hypophos.

It contains, when dried to constant weight in a desiccator over sulphuric acid, not less than 98 per cent. of $Ca(PH_2O_2)_2$ (170.18). Preserve it in well-closed containers. Caution should be observed in dispensing Calcium Hypophosphite as an explosion is liable to occur when it is triturated or heated with nitrates, chlorates, or other oxidizing agents.

Calcium Hypophosphite occurs as colorless, transparent, monoclinic prisms, as small lustrous scales, or as a white, crystalline powder; odorless, having a nauseous and bitter taste, permanent in the air.

One Gm. of Calcium Hypophosphite is slowly soluble in 6.5 mils of water at 25° C.; insoluble in alcohol.

When heated the salt decrepitates and begins to decompose, giving off water and evolving spontaneously inflammable hydrogen phosphide, and on complete ignition leaving a residue of calcium pyrophosphate.

When an aqueous solution of the salt (1 in 20), acidulated with hydrochloric acid, is added, drop by drop with agitation, to an excess of mercuric chloride T.S., a white precipitate of mercurous chloride is formed. Upon the further addition of the solution of Calcium Hypophosphite the precipitate becomes gray from reduction to metallic mercury.

An aqueous solution of Calcium Hypophosphite (1 in 20) yields with ammonium oxalate T.S. a white precipitate, insoluble in acetic acid, but soluble in hydrochloric acid.

Dissolve 1 Gm. of the salt in 20 mils of distilled water; it requires not more than 1 mil of tenth-normal potassium hydroxide V.S. to produce a pink color, phenolphthalein T.S. being used as indicator.

When 1 Gm of the salt is dissolved in 20 mils of distilled water, not more than 0.005 Gm. of residue remains (*phosphate*).

Mix 5 mils of an aqueous solution of the salt (1 in 10) in a test tube with 0.5 mil of diluted hydrochloric acid and heat on a water bath; no offensive odor develops within thirty minutes.

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

Pour 5 mils of an aqueous solution of the salt (1 in 25) into a beaker containing 3 mils of nitric acid, diluted with about 10 mils of distilled water, and evaporate it to dryness on a water bath. The residue meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Assay—Dissolve about 0.75 Gm. of Calcium Hypophosphite, previously dried to constant weight in a desiccator over sulphuric acid and accurately weighed, in 10 mils of distilled water, add 10 mils of nitric acid and evaporate to dryness on a water bath. Add 5 mils of nitric acid to the residue, again evaporate to dryness on a water bath and dissolve the residue in sufficient distilled water to measure 100 mils. Transfer 10 mils of this solution to a 100 mil graduated flask, add sodium hydroxide T.S. (free from chloride) until a slight, permanent precipitate is produced; then add 50 mils of tenth-normal silver nitrate V.S. and proceed as directed in the assay under *Sodii Phosphas*. When calculated to the amount originally taken it shows not less than 98 per cent. of $Ca(PH_2O_2)_2$.

Each mil of tenth-normal silver nitrate V.S. used corresponds to 0.002836 Gm. of $Ca(PH_2O_2)_2$. Each gramme of Calcium Hypophosphite, dried to constant weight, corresponds to not less than 345.5 mils of tenth-normal silver nitrate V.S.

Preparation—Syrupus Hypophosphitum.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

CALCII LACTAS

Calcium Lactate

Calc. Lact.

The hydrated form of Calcium Lactate [$Ca(C_3H_5O_3)_2+5H_2O=$ 308.23]. It contains, when dried to constant weight at 120° C., not less than 98 per cent. of $Ca(C_3H_5O_3)_2$ (218.15). Preserve it in well-closed containers.

Calcium Lactate occurs in white, granular masses or powder; odorless and nearly tasteless.

It is somewhat efflorescent; at 120° C. it becomes anhydrous. When dried to a constant weight at that temperature the loss is not more than 29.2 per cent. (corresponding to 5 molecules of water of crystallization) nor less than 25 per cent.

One Gm. of Calcium Lactate dissolves in 20 mils of water at 25° C.; almost insoluble in alcohol.

An aqueous solution of Calcium Lactate (1 in 20) is neutral, slightly acid, or slightly alkaline to litmus, but is not reddened by phenolphthalein T.S.

Acidulate an aqueous solution of the salt (1 in 20) with sulphuric acid, add potassium permanganate and heat the mixture; the odor of acetaldehyde is developed. With ammonium oxalate T.S. an aqueous solution (1 in 20) yields a white precipitate, insoluble in acetic acid but soluble in hydrochloric acid.

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

Add ammonium oxalate T.S. to 20 mils of a hot aqueous solution of the salt (1 in 20) until no further precipitate is produced, filter the mixture after three hours, and wash the precipitate with 50 mils of distilled water. The combined filtrate and washings leave not more than 0.01 Gm. of residue on evaporation and subsequent ignition (*magnesium and alkalies*).

Stir about 0.5 Gm. of the salt with 1 mil of sulphuric acid; the mixture does not emit an odor of volatile fat-acids, even on warming.

Assay—Incinerate in a crucible about 2 Gm. of the salt, previously dried to constant weight at 120° C. and accurately weighed, dissolve the residue in 50 mils of half normal hydrochloric acid V.S. and titrate the excess of acid with half-normal potassium hydroxide V.S., using methyl orange T.S. as indicator. It shows, in the dried salt, not less than 98 per cent. of $Ca(C_3H_5O_3)_2$.

Each mil of half-normal hydrochloric acid V.S. used corresponds to 0.05454 Gm. of $Ca(C_3H_5O_3)_2$. Each gramme of dried Calcium Lactate corresponds to not less than 17.97 mils of half-normal hydrochloric acid V.S.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

CALCII SULPHIDUM CRUDUM

Crude Calcium Sulphide

Calc. Sulphid. Crud.—Calx Sulphurata, U.S.P. VIII Sulphurated Lime

It contains not less than 55 per cent. of CaS (72.14). Preserve it in well-closed containers.

Crude Calcium Sulphide is a pale gray or yellowish powder, having a faint odor of hydrogen sulphide and a nauseous and alkaline taste. It gradually decomposes on exposure to moist air.

Crude Calcium Sulphide is very slightly soluble in cold water; more readily soluble in boiling water with partial decomposition; readily dissolved by solutions of ammonium salts; insoluble in alcohol.

When Crude Calcium Sulphide is decomposed by diluted acetic acid, hydrogen sulphide is evolved and a residue of calcium sulphate and carbon frequently remains. The filtered solution yields with ammonium oxalate T.S. a white precipitate insoluble in acetic acid, but soluble in hydrochloric acid.

Assay—Introduce about 0.2 Gm of Crude Calcium Sulphide, accurately weighed, into a glass-stoppered bottle or flask; add 50 mils of distilled water, mix, and quickly introduce 30 mils of a 10 per cent. ammonium chloride solution and immediately stopper the flask. Agitate the contents for a few minutes, add quickly 20 mils of a 10 per cent. cadmium chloride solution, immediately insert the stopper and again agitate well for a few minutes. Then add 5 mils of acetic acid, heat the mixture on a water bath for fifteen minutes, decant the supernatant liquid through a filter, agitate the remaining precipitate with 10 mils of diluted acetic acid, transfer the precipitate to the filter and wash with 10 mils of diluted acetic acid. Return the filter and precipitate to the original flask, add

50 mils of tenth-normal iodine V.S. and 20 mils of a mixture of equal volumes of hydrochloric acid and water. Stopper the flask and agitate it vigorously for a few minutes, and then titrate the excess of iodine with tenth-normal sodium thiosulphate V.S. It shows not less than 55 per cent. of CaS.

Each mil of tenth-normal iodine V.S. used corresponds to 0.003607 Gm. of CaS. Each gramme of Crude Calcium Sulphide corresponds to not less than 152.5 mils of tenth-normal iodine V.S.

AVERAGE DOSE—Metric, 0.06 Gm.—Apothecaries, 1 grain.

CALUMBA

Calumba

Calumb.—Columba Columbo Colombo

The dried root of *Jateorhiza palmata* (Lamarck) Miers (Fam. *Menispermaceæ*).

In circular or oval disks attaining a diameter of 9 cm. and seldom exceeding 2 mm. in thickness, or in longitudinal or in oblique slices attaining a length of 30 cm., a breadth of 35 mm. and a thickness of 16 mm.; externally brown and roughly wrinkled; cut surface varying from yellowish-brown to grayish-yellow, the transverse slices distinctly radiate in the outer portion and with a dark cambium; central portion often depressed; fracture short, mealy; odor slight; taste slightly aromatic, very bitter.

The powder is greenish-brown to grayish-yellow; starch grains numerous, mostly single, occasionally 2- to 3-compound, the individual grains from 0.003 to 0.085 mm. in the long diameter, ovoid, ellipsoidal, frequently very irregular, slightly lamellated, with an excentral linear x-shaped or branching cleft; stone cells few with irregularly thickened, strongly lignified, coarsely porous walls and containing one or more prisms of calcium oxalate from 0.01 to 0.03 mm. in length, or numerous sphenoidal micro-crystals; fragments with tracheæ few, the latter with reticulate thickenings or bordered pores, and associated with wood-fibers having long, oblique, slit-like pores.

Calumba yields not more than 8 per cent. of ash.

Preparation—Tinctura Calumbæ.

AVERAGE DOSE—Metric, 2 Gm.—Apothecaries, 30 grains.

CALX

Calcium Oxide

Lime Quicklime

It contains, when freshly ignited to constant weight with a blast lamp, not less than 95 per cent. of CaO (56.07). It loses not more than 10 per cent. of its weight on ignition. Preserve it in air-tight containers in a dry place.

Calcium Oxide occurs in hard, white or grayish-white masses or granules, or as a white powder; odorless and having a caustic taste.

One Gm. of Calcium Oxide dissolves in 840 mils of water at 25° C.; also in 1740 mils of boiling water; soluble in glycerin and syrup; insoluble in alcohol.

When moistened with water, Calcium Oxide becomes heated, and is gradually converted into a white powder (calcium hydroxide or slaked lime). When this is mixed with about 3 or 4 times its weight of water, it forms a smooth magma (milk of lime).

Water, when agitated with Calcium Oxide, becomes alkaline to litmus.

Slake 1 Gm. of Calcium Oxide, thoroughly mix it with 50 mils of water, and decant the greater portion of the milky liquid; the addition of an excess of diluted hydrochloric acid to the residue does not cause more than a slight effervescence (*carbonate*).

Mix 5 Gm. of Calcium Oxide, after slaking, with 100 mils of distilled water, followed by hydrochloric acid, drop by drop, with agitation until solution takes place. The resulting solution, after boiling and cooling, should be acid and should not deposit more than 0.05 Gm. of insoluble matter.

Ammonium oxalate T.S. added to a portion of this solution, after neutralizing it with ammonia water, yields a white precipitate, insoluble in acetic acid, but soluble in hydrochloric acid.

Ignite to constant weight with a blast lamp in a tared platinum crucible a portion of Calcium Oxide; it loses not more than 10 per cent. in weight of the Calcium Oxide taken (*volatile substances*).

Assay—Dissolve about 1 Gm. of Calcium Oxide, previously ignited to constant weight over a blast lamp and accurately weighed, in 20 mils of diluted hydrochloric acid, cool the solution, dilute with distilled water to 100 mils and mix well. Transfer 20 mils of this solution to a 200 mil graduated flask and proceed with the assay as directed under *Calcii Carbonas Præcipitatus.*

Each mil of tenth-normal oxalic acid V.S. corresponds to 0.0028035 Gm. of CaO. Each gramme of freshly ignited Calcium Oxide corresponds to not less than 338.9 mils of tenth-normal oxalic acid V.S.

Preparation—Liquor Calcis.

CALX CHLORINATA

Chlorinated Lime

Calx Chlorin.—"Chloride of Lime"

A product resulting from the action of chlorine upon calcium hydroxide, and containing not less than 30 per cent. of available chlorine [Cl=35.46]. Preserve it in air-tight containers, in a cool and dry place.

Chlorinated Lime occurs as a white, or grayish-white, granular powder, having the odor of chlorine. It becomes moist and gradually decomposes on exposure to the air and when in such condition must not be used or dispensed.

It is partially soluble in water or alcohol. The insoluble portion settles readily when it is mixed with water. If lumps are present they readily break down and leave no core.

Shake 1 Gm. of Chlorinated Lime with 50 mils of distilled water and filter; the filtrate at first colors red litmus blue, and then bleaches it.

Dissolve Chlorinated Lime in diluted acetic acid; an abundance of chlorine gas is evolved, and only a trifling residue remains undissolved.

Ammonium oxalate T.S. added to this solution yields a white precipitate, insoluble in acetic acid, but soluble in hydrochloric acid.

Assay—Introduce into a tared, stoppered weighing-bottle, containing 10 mils of distilled water, between 3 and 4 Gm. of Chlorinated Lime and weigh accurately. Triturate this thoroughly with 50 mils of distilled water, transfer the mixture to a graduated liter flask, rinse the mortar with distilled water, add the rinsings to the mixture and then sufficient distilled water to make 1000 mils, stopper the flask and allow it to stand for ten minutes. Shake it thoroughly, add to 100 mils of the mixture 1 Gm. of potassium iodide and 5 mils of acetic acid, and titrate with tenth-normal sodium thiosulphate V.S., starch T.S. being used as indicator. When calculated to the weight of Chlorinated Lime taken, it shows not less than 30 per cent. of available chlorine.

Each mil of tenth-normal sodium thiosulphate V.S. used corresponds to 0.003546 Gm. of available chlorine (Cl). Each gramme of Chlorinated Lime corresponds to not less than 84.6 mils of tenth-normal sodium thiosulphate V.S.

CAMBOGIA

Gamboge

Cambog.—Pipe Gamboge

A gum-resin obtained from *Garcinia Hanburii* Hooker filius (Fam. *Guttiferæ*).

In hard, brittle, cylindrical pieces, usually hollow in the center, from 2 to 5 cm. in diameter, from 10 to 20 cm. in length, externally grayish-orange-brown, longitudinally striate; fracture conchoidal, smooth, orange-red; odorless; taste very acrid.

When rubbed with water it yields a yellow emulsion which becomes darker and almost transparent upon the addition of ammonia water. The emulsion turns green upon the addition of iodine T.S. (*starch*).

The powder is bright yellow, containing few or no starch grains. When mounted in hydrated chloral T.S. and examined under the microscope the particles, for the most part, slowly dissolve, leaving scattered fragments of vegetable tissues.

Not less than 65 per cent. of Gamboge is soluble in alcohol.

Gamboge yields not more than 2 per cent. of ash.

Preparation—Pilulæ Catharticæ Compositæ.

AVERAGE DOSE—Metric, 0.125 Gm.—Apothecaries, 2 grains.

CAMPHORA

Camphor

Camph.

A ketone [$C_{10}H_{16}O$ or $C_9H_{16}CO = 152.13$] obtained from *Cinnamomum Camphora* (Linné) Nees et Ebermaier (Fam. *Lauraceæ*); it is dextrorotatory. Preserve it in well-closed containers, in a cool place.

Camphor occurs in white, translucent masses or granules of a tough consistence and having a penetrating, characteristic odor, and a pungent, aromatic taste. It is readily pulverizable in the presence of a little alcohol, ether or chloroform.

Camphor is slightly soluble in water and freely soluble in alcohol, chloroform, ether, carbon disulphide, petroleum benzin, or in fixed or volatile oils.

Specific gravity: about 0.990 at 25° C.

Camphor melts between 174° and 177° C.

The specific rotation $[\alpha]_D$ of Camphor in a solution in alcohol at 25° C. is between +41° and +42° in a 200 mm. tube, containing 10 Gm. of Camphor in each 100 mils of solution. The alcohol must be of the strength of about 95 per cent. by volume.

It volatilizes at ordinary temperatures. On gradually heating about 2 Gm. of Camphor, it sublimes without carbonization and without leaving more than 0.05 per cent. of ash.

A solution of Camphor in petroleum benzin (1 in 10) is clear (*moisture*).

Hold the looped end of a piece of clean copper wire in a non-luminous flame until it glows, without coloring the flame green, then dip the loop into Camphor, ignite the adhering Camphor, and hold it so that the liquid burns outside of a non-luminous flame. On slowly bringing the flame from the burning Camphor on the loop in contact with the lower outer edge of the non-luminous flame, no green tinge is discernible (*chlorinated products*).

Preparations—Aqua Camphoræ Linimentum Belladonnæ Linimentum Camphoræ Linimentum Chloroformi Linimentum Saponis Spiritus Camphoræ Tinctura Opii Camphorata.

	Metric	Apothecaries
AVERAGE DOSE—By mouth,	0.2 Gm.—	3 grains.
Hypodermic,	0.1 Gm.—	1½ grains.

CAMPHORA MONOBROMATA

Monobromated Camphor

Camph. Monobrom.

Ortho-monobromcamphor [$C_{10}H_{15}OBr$ or $C_9H_{15}Br.CO = 231.04$]. Preserve it in well-closed containers, protected from light.

Monobromated Camphor occurs in colorless, prismatic needles or scales, or as a powder having a mild but characteristic, camphoraceous odor and taste; permanent in the air. It is decomposed by prolonged exposure to sun-light.

One Gm. of Monobromated Camphor dissolves in 6.5 mils of alcohol, 0.5 mil of chloroform, and in 1.6 mils of ether at 25° C.; almost insoluble in water.

It melts between 74° and 76° C.

Heat a mixture of about 0.1 Gm. each of Monobromated Camphor and silver nitrate and 2 mils each of nitric acid and sulphuric acid until nitrous vapors are no longer evolved; a yellowish precipitate of silver bromide is obtained.

Incinerate about 2 Gm. of Monobromated Camphor; not more than 0.05 per cent. of ash remains.

Shake about 0.5 Gm. of powdered Monobromated Camphor with 10 mils of distilled water and filter. The filtrate is neutral to litmus and is not rendered more than slightly opalescent by the addition of a few drops of silver nitrate T.S. (*soluble bromide*).

AVERAGE DOSE—Metric, 0.125 Gm.—Apothecaries, 2 grains.

CANNABIS

Cannabis

Cannab.—Cannabis Indica, U.S.P. VIII Guaza Ganjah

The dried flowering tops of the pistillate plants of *Cannabis sativa* Linné, or of the variety *indica* Lamarck (Fam. *Moraceæ*), freed from the thicker stems and large foliage leaves and without the presence or admixture of more than 10 per cent. of fruits or other foreign matter. Cannabis, made into a fluidextract in which *one hundred mils* represent *one hundred grammes* of the drug, when assayed biologically, produces incoördination when administered to dogs in a dose of not more than 0.03 mil of fluidextract per kilogramme of body weight.

In dark green or greenish-brown and more or less agglutinated fragments, consisting of the short stems with their leaf-like bracts and pistillate flowers, some of the latter being replaced with more or less developed fruits; stems cylindrical, of varying length, not more than 3 mm. in diameter, longitudinally furrowed, light green to light brown, strigose-pubescent; leaves digitately compound; leaflets, when soaked in water and spread out, linear-lanceolate, nearly sessile, margin deeply serrate; bracts ovate, pubescent, each enclosing one or two pistillate flowers, or more or less developed fruits; calyx dark green, pubescent and somewhat folded around the ovary or fruit; styles two, filiform and pubescent; ovary with a single campylotropous ovule; fruit light green to light brown, broadly ellipsoidal, about 3.5 mm. in length, finely wrinkled and slightly reticulated; odor agreeably aromatic; taste characteristic.

The powder is dark green, giving a strong effervescence on the addition of dilute hydrochloric acid; numerous sharp pointed fragments of upper portion of non-glandular hairs and fragments of bracts and leaves showing yellowish-brown laticiferous vessels, rosette aggregates of calcium oxalate from 0.005 to 0.025 mm. in diameter; non-glandular hairs unicellular, with a very slender pointed apex and a considerably enlarged base containing, usually in the lumen, some calcium carbonate; glandular hairs of two kinds, one with a short, one-celled stalk and the other with a multicellular, long, tongue-shaped stalk, the glandular portion being globular and consisting of from 8 to 16 cells, fragments of fruits with palisade-like, non-lignified sclerenchymatous cells, walls yellowish-brown, finely porous, the lumina usually containing air; tissues of embryo and endosperm with numerous oil globules and aleurone grains, the latter from 0.005 to 0.01 mm. in diameter and consisting of large crystalloids and globoids.

The yield of alcohol extractive is not less than 8 per cent. and the alcoholic solution is of a bright green color.

Cannabis yields not more than 15 per cent. of ash.

Assay—Prepare a fluidextract and proceed as directed under Biological Assays (Part II).

Preparations—Extractum Cannabis   Fluidextractum Cannabis   Tinctura Cannabis.

CANTHARIS

Cantharides

Canthar.—Spanish Flies   Russian Flies

The dried beetles, *Cantharis vesicatoria* (Linné) De Geer (Fam. *Meloideæ*, Order *Coleoptera*), yielding not less than 0.6 per cent. of cantharidin. Preserve Cantharides in tightly-closed containers, adding a few drops of chloroform or carbon tetrachloride, from time to time, to prevent attack by insects.

From 15 to 25 mm. in length, 5 to 8 mm. in breadth, oblong, somewhat compressed above; of a brilliant green or bluish-green, metallic luster, changing in different parts, especially beneath, to a golden-green; head triangular, separated into two lateral lobes by a faint median line; mandibles stout and partly concealed; antennæ filiform, of 11 conical joints, the upper ones being black; eyes comparatively small; prothorax angulate; legs with five tarsal joints; wings membranous and brownish; elytra or wing sheaths each with two parallel lines and finely wrinkled; odor strong, disagreeable; taste slight, afterwards acrid.

Cantharides with an ammoniacal odor must not be used.

The powder is grayish-brown, with shining green particles and a number of long, pointed, 1-celled hairs 0.5 mm. in length and 0.02 mm. in width.

Cantharides does not contain more than 10 per cent. of moisture.

Cantharides yields not more than 9 per cent. of ash.

Assay—Introduce 15 Gm. of Cantharides, in No. 40 powder, into a stout bottle of not less than 250 mils capacity, add 150 mils of a mixture of benzene, two volumes, and purified petroleum benzin, one volume, and then add 2 mils of hydrochloric acid. Stopper the bottle tightly, shake it well, and allow it to stand about ten hours. Now gradually warm the bottle and its contents to about 40° C. and maintain it at that temperature with frequent shaking during three hours. Cool the mixture, decant or filter off 100 mils of the clear solution and evaporate this rapidly in a tared beaker or wide-necked flask to a volume of about 5 mils. Now add 5 mils of chloroform to the residue and set it aside in a moderately warm place. When the solvent has all evaporated, add to the crystals 10 mils of a mixture of equal volumes of dehydrated alcohol and purified petroleum benzin, which has previously been saturated with pure cantharidin, allow the mixture to stand during fifteen minutes and then decant the liquid through a pellet of purified cotton. Wash the crystals with successive portions of a saturated solution of cantharidin, similar to that directed above, until it is free from fat and coloring matter, and pass the washings through the same pellet of purified cotton. Then wash the cotton with a very small quantity of warm chloroform to dissolve any adhering crystals, collect the chloroform in the tared flask or beaker containing the washed crystals, evaporate the solvent with the aid of a blast of air, dry the crystals at 60° C. for one-half hour and weigh. The resulting weight will be the amount of cantharidin obtained from ten grammes of Cantharides.

Preparations—Ceratum Cantharidis Collodium Cantharidatum Tinctura Cantharidis.

CAPSICUM

Capsicum

Capsic.—Cayenne Pepper African Chillies

The dried ripe fruits of *Capsicum frutescens* Linné (Fam. *Solanaceæ*), without the presence or admixture of more than 2 per cent. of stems, calyxes or other foreign matter.

Oblong-conical, from 8 to 20 mm. in length and from 2 to 15 mm. in diameter; pericarp brownish-red or orange, shining, membranous and translucent; 2- or 3-locular, united below, and containing 6 to 17 flat, reniform, yellowish seeds attached to the placenta or frequently separated from it; odor characteristic, sternutatory; taste intensely pungent.

The calyx, when present, light greenish-brown, inferior, inconspicuous, 5-toothed, usually attached to a long straight peduncle.

The powder is yellowish-brown; mounts made with hydrated chloral T.S. and examined under the microscope show yellowish-red oil globules; stone cells of two kinds, those of the endocarp being more or less elongated, walls yellowish, uniformly and moderately thickened, wavy in outline, porous and slightly lignified, those of the seed-coat being yellowish, irregular and strongly thickened, wavy in outline and strongly lignified.

Capsicum yields not less than 15 per cent. of non-volatile extractive, soluble in ether (see Part II, Test No. 13).

Capsicum yields not more than 7 per cent. of ash. The amount of ash, insoluble in hydrochloric acid, does not exceed 1 per cent. of the weight of Capsicum taken.

Preparations—Oleoresina Capsici Tinctura Capsici.

AVERAGE DOSE—Metric, 0.06 Gm.—Apothecaries, 1 grain.

CARBO LIGNI

Wood Charcoal

Carbo Lig.—Charcoal

Charcoal prepared from soft wood, and very finely powdered. Preserve it in well-closed vessels.

Wood charcoal is a black, odorless, and tasteless powder, free from gritty matter.

It burns without a luminous flame. Incinerate about 1 Gm. of Charcoal; not more than 7.5 per cent. of ash remains.

Boil about 1 Gm. of Charcoal with a mixture of 3 mils of potassium hydroxide T.S. and 10 mils of distilled water for one-half minute; the filtrate shows only a slight brown color.

Average dose—Metric, 1 Gm.—Apothecaries, 15 grains.

CARDAMOMI SEMEN

Cardamom Seed

Cardam. Sem.—Cardamomum, U.S.P. VIII Cardamon

The dried seeds of *Elettaria Cardamomum* White et Maton (Fam. *Zingiberaceæ*), recently removed from the capsules.

Mostly agglutinated in groups of from 2 to 7, the individual seeds, oblong-ovoid in outline, 3- or irregularly 4-sided, convex on the dorsal surface, strongly longitudinally grooved on one side, from 3 to 4 mm. in length; externally reddish-gray-brown, coarsely tuberculated, and with more or less adhering portions of the membranous aril; in section showing a thin reddish-brown seed-coat, a large white perisperm and a central, greenish endosperm enclosing a small straight embryo; odor aromatic; taste aromatic, pungent.

The powder is greenish-brown; consisting chiefly of coarse angular fragments of cells of the reserve layers and seed-coat; cells of endosperm and perisperm filled with compound starch grains, the individual grains from 0.001 to 0.004 mm. in diameter; fragments of seed with dark brown stone cells, which are polygonal in surface view and about 0.02 mm. in diameter; in mounts made with hydrated chloral T.S. single prisms or crystals in rosette aggregates may separate in the cells of the endosperm and perisperm; fragments of spiral tracheæ with accompanying slightly lignified bast-fibers relatively few.

Cardamom Seed yields not more than 8 per cent. of ash.

Preparations—Tinctura Cardamomi Tinctura Cardamomi Composita.

Average dose—Metric, 1 Gm.—Apothecaries, 15 grains.

CARUM

Caraway

Carawayseed Caraway Seed

The dried fruit of *Carum Carvi* Linné (Fam. *Umbelliferæ*). Without the presence or admixture of more than 3 per cent. of other fruits, seeds or foreign matter. Preserve Caraway in tightly-closed containers, adding a few drops of chloroform or carbon tetrachloride, from time to time, to prevent attack by insects.

Mericarps usually separated, crescent-shaped, 3 to 7 mm. in length, 1.5 mm. in diameter; externally dark brown with 5 yellowish filiform ribs; in transverse section nearly equilaterally pentagonal, the commissural surface with two vittæ, the dorsal surface with a vitta between each of the primary ribs; oily endosperm large, enclosing a small embryo; odor and taste agreeably aromatic.

Under the microscope, transverse sections of Caraway show an epidermal layer of slightly tangentially elongated cells with thick outer walls; a layer of several rows of tangentially elongated parenchyma cells, frequently more or less collapsed; a single, large, elliptical, brown vitta or oil-tube between each of the ribs and surrounded by small epithelial or secretion cells; in each of the ribs a single fibro-vascular bundle surrounded by a layer of thick-walled sclerenchymatous fibers; inner epidermis of broadly elongated cells with very thin side walls, being very frequently broken and closely coherent with the more or less brownish collapsed cells of the seed-coat; commissural surface with 2 large vittæ and at the middle portion 2 large transverse hollow spaces formed by the separation of the tissues of the seed-coat on one side and the pericarp on the other, otherwise the cells resemble those on the dorsal surface; endosperm large, cells polygonal with thick walls and containing a fixed oil and aleurone grains, the latter not infrequently containing a small rosette aggregate or prism of calcium oxalate.

The powder is yellowish-brown, mostly of irregular, angular fragments; cells of endosperm with aleurone grains each usually containing a rosette aggregate of calcium oxalate about 0.001 mm. in diameter; fragments with light-yellow vittæ, together with nearly isodiametric or polygonal, yellowish-brown, inner epidermal cells of pericarp; fragments with tracheæ and sclerenchymatous fibers, the latter 0.01 mm. in width, slightly lignified and with numerous oblique pores.

Caraway yields not more than 8 per cent. of ash.

Average dose—Metric, 1 Gm.—Apothecaries, 15 grains.

CARYOPHYLLUS

Clove

Caryoph.—Cloves

The dried flower-buds of *Eugenia aromatica* (Linné) O. Kuntze, *Jambosa Caryophyllus* (Sprengel) Niedenzu (Fam. *Myrtaceæ*), without the presence or admixture of more than 5 per cent. of the peduncles, stems or other foreign matter.

From 10 to 17.5 mm. in length, of a dark brown or brownish-black color, consisting of a stem-like, solid, inferior ovary, obscurely four-angled or somewhat compressed, terminated by four calyx teeth, and surmounted by a nearly globular head, consisting of four petals, which enclose numerous curved stamens and one style; odor strongly aromatic; taste pungent and aromatic, followed by slight numbness.

When Clove is pressed strongly between the thumbnail and finger the volatile oil becomes visible.

Stems either separate or attached to the flower-buds; sub-cylindrical or four-angled, attaining a length of 25 mm. and a diameter of 4 mm., either simple, branching or distinctly jointed, and less aromatic than the flower-buds.

The powder varies from dark brown to reddish-brown and consists chiefly of cellular fragments showing the large oil reservoirs, spiral tracheæ and a few somewhat thick-walled, slightly-lignified, spindle-shaped bast-fibers; calcium oxalate in rosette aggregates, from 0.01 to 0.015 mm. in diameter; pollen grains numerous, tetrahedral, somewhat ellipsoidal, from 0.015 to 0.02 mm. in diameter. The presence of stems in the powder is shown by stone cells of irregular, polygonal shape, 0.07 mm. in diameter, with thick porous walls and large lumina, the latter frequently filled with a yellowish-brown amorphous substance.

Clove yields not less than 10 per cent. of volatile extractive soluble in ether (see Part II, Test No. 12).

Clove yields not more than 8 per cent. of ash. The amount of ash, insoluble in hydrochloric acid, does not exceed 0.5 per cent. of the weight of Clove taken.

Average dose—Metric, 0.25 Gm.—Apothecaries, 4 grains.

CASCARA SAGRADA

Cascara Sagrada

Casc. Sagr.—Rhamnus Purshiana, U.S.P. VIII

The dried bark of the trunk and branches of *Rhamnus Purshiana* De Candolle (Fam. *Rhamnaceæ*).

Usually in flattened or transversely curved pieces, occasionally in quills; bark from 1 to 5 mm. in thickness; outer surface dark brown or brownish-red, longitudinally ridged, often nearly covered with grayish or whitish lichens, bearing small blackish apothecia, sometimes with numerous lenticels, and occasionally with mosses; inner surface light yellow, light brown, or reddish-brown, longitudinally striate, turning red when moistened with solutions of the alkalies; fracture short, with projections of bast-fibers in the inner bark; in cross section inner bark shows diagonal or curved medullary rays, forming converging groups, the outer bark showing yellowish groups of stone cells which are especially apparent on moistening the freshly cut surface with phloroglucinol T.S. and hydrochloric acid; odor distinct; taste disagreeable, bitter, and slightly acrid.

Under the microscope, a transverse section of Cascara Sagrada shows an outer yellowish-brown or reddish-brown corky layer consisting of 10 to 15 or more rows of cells; stone cells in outer bark in tangentially elongated groups of 20 to 50 cells, the walls being very thick and finely lamellated; medullary rays 1 to 4 cells wide, 15 to 25 cells deep, the contents being colored red upon the addition of solutions of the alkalies to the sections; bast-fibers in tangentially elongated groups in the inner bark, the walls being thick and strongly lignified; crystal fibers around the bast-fibers with individual crystals from 0.008 to 0.015 mm. in length; parenchyma with spheroidal starch grains about 0.003 to 0.008 mm. in diameter, or with calcium oxalate either in rosette aggregates or prisms from 0.01 to 0.02 mm. in diameter.

Add 0.1 Gm. of powdered Cascara Sagrada to 10 mils of hot water, shake the mixture occasionally until cold, filter it and add sufficient water to make 10 mils; on the addition of 10 mils of ammonia water to this liquid, it is colored an orange yellow.

Macerate 0.1 Gm. of powdered Cascara Sagrada with 10 drops of alcohol, boil the mixture with 10 mils of water, when cold filter it and shake the filtrate with 10 mils of ether; a yellow ethereal solution separates. Shake 3 mils of this ethereal solution with 3 mils of ammonia water; the separated ammoniacal solution still possesses, on diluting with 20 mils of water, a distinct, yellowish-red color.

The powder is light brown to olive brown, showing characteristic elongated groups of bast-fibers associated with crystal fibers, the crystals in the latter being in the form of monoclinic prisms from 0.008 to 0.015 mm. in length; stone cells in large groups, the cells having thick and finely porous walls; fragments of parenchyma and medullary ray cells colored red upon the addition of solutions of the alkalies; starch grains either free or in parenchyma cells, the individual grains being somewhat spheroidal, from 0.003 to 0.008 mm. in diameter; calcium oxalate in monoclinic prisms or rosette aggregates from 0.01 to 0.02 mm. in diameter; occasional fragments of reddish-brown cork.

Preparations—Extractum Cascaræ Sagradæ Fluidextractum Cascaræ Sagradæ Fluidextractum Cascaræ Sagradæ Aromaticum.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

CERA ALBA

White Wax

Cer. Alb.

Yellow Wax, bleached.

White Wax is a yellowish-white solid, somewhat translucent in thin layers, having a faint, characteristic odor; it is free from rancidity, and nearly tasteless.

Specific gravity: 0.950 to 0.960 at 25° C., as determined by the method given under *Cera Flava.*

It melts between 62° and 65° C.

The acid value is not less than 17 nor more than 23, and the ester value not less than 72 nor more than 79, as determined by the methods given under *Cera Flava.*

In other respects White Wax has the characteristics of Yellow Wax and responds to the tests for identity and purity under *Cera Flava.*

CERA FLAVA

Yellow Wax

Cer. Flav.—Beeswax

A product obtained by melting and purifying the honey-comb of the bee, *Apis mellifera,* Linné (Fam. *Apidæ*).

Yellow Wax is a yellow to gray-brown solid, having an agreeable, honey-like odor, and a faint characteristic taste.

It is somewhat brittle when cold, and when broken presents a dull, granular, not crystalline fracture. By the heat of the hand, it becomes plastic.

Yellow wax is insoluble in water, sparingly soluble in cold alcohol; boiling alcohol dissolves the cerotic acid and a portion of the myrocin. It is completely soluble in chloroform, ether, or in fixed or volatile oils; partly soluble in cold benzene or carbon disulphide, and completely soluble in these liquids at a temperature of from 25° to 30° C.

Specific gravity: 0.950 to 0.960 at 25° C., determined as follows.

Melt the Wax at a low temperature and allow it to fall in separated drops from just above the surface into alcohol that has been warmed to from 45° to 50° C. Allow the globules to remain in the alcohol until it has cooled spontaneously to room temperature (20° to 25° C.), then remove the Wax and keep it at room temperature for 24 hours. Prepare a mixture of 4 volumes of alcohol and enough distilled water to make 10 volumes and allow it to stand until free from air bubbles. Moisten the globules of Wax with distilled water, by means of a brush, and place them by means of forceps in the alcohol solution just prepared contained in a beaker. Then add alcohol or air-free distilled water as required to the mixture, kept at 25° C., until the globules of Wax float or rest indifferently in the liquid, and finally determine the specific gravity of the alcoholic liquid. The figure thus obtained is the specific gravity of the Wax examined.

It melts between 62° and 65° C.

Boil 1 Gm. of Yellow Wax for half an hour with 35 mils of an aqueous solution of sodium hydroxide (1 in 7), the volume being preserved by the occasional addition of distilled water; the Wax separates on cooling without rendering the liquid opaque, and no precipitate is produced in the liquid after filtration through glass wool or asbestos, on the addition of hydrochloric acid in excess (*fats or fatty acids, Japan wax, or rosin*). Hydrochloric acid produces no precipitate in water which has been boiled with a portion of the Wax (*soap*).

Warm about 3 Gm. of Yellow Wax, accurately weighed, in a 200 mil flask with 25 mils of neutral dehydrated alcohol until melted, then add 1 mil of phenolphthalein T.S. and titrate the mixture while warm with half-normal alcoholic potassium hydroxide V.S. to a faint pink color. The acid value so obtained is not less than 18 nor more than 24. Now add 25 mils of half-normal alcoholic potassium hydroxide V.S. and 50 mils of alcohol, boil the mixture for two hours under a reflux condenser and titrate the excess of the alkali with half-normal hydrochloric acid V.S. The ester value so obtained is not less than 72 nor more than 77.

CERATUM

Cerate

Cerat.—Simple Cerate

WHITE WAX, *three hundred grammes*	300 Gm.
BENZOINATED LARD, *seven hundred grammes*	700 Gm.
To make *one thousand grammes*	1000 Gm.

Melt the white wax by the heat of a water bath, add the benzoinated lard, continue the heat until the mixture is liquefied, strain if necessary and stir constantly until it congeals.

For use in southern latitudes and during the heated season in other localities, 50 Gm. of the benzoinated lard (or more, if necessary) may be replaced by an equal quantity of white wax.

CERATUM CANTHARIDIS

Cantharides Cerate

Cerat. Canthar.—Blistering Cerate

CANTHARIDES, in No. 60 powder, *three hundred and fifty grammes*	350 Gm.
GLACIAL ACETIC ACID, *twenty-five milliliters*	25 mils
OIL OF TURPENTINE, *one hundred and fifty milliliters*	150 mils
YELLOW WAX, *one hundred and seventy-five grammes*	175 Gm.
ROSIN, *one hundred and seventy-five grammes*	175 Gm.
BENZOINATED LARD, *two hundred grammes*	200 Gm.
To make *one thousand grammes*	1000 Gm.

Moisten the cantharides with the oil of turpentine and the glacial acetic acid, previously mixed, and set the mixture aside in a well-covered container, in a warm place, for forty-eight hours. Melt together the rosin, yellow wax, and benzoinated lard; strain the mixture through muslin, add the macerated cantharides and keep the mixture in a liquid condition by heating it on a water bath with occasional stirring, until it is reduced in weight to *one thousand grammes*. Then withdraw the heat and stir the Cerate until it becomes firm.

Preparation—Emplastrum Cantharidis.

CERATUM RESINÆ

Rosin Cerate

Cerat. Res.—Basilicon Ointment

ROSIN, *three hundred and fifty grammes*	350 Gm.
YELLOW WAX, *one hundred and fifty grammes*	150 Gm.
LARD, *five hundred grammes*	500 Gm.
To make *one thousand grammes*	1000 Gm.

Melt the rosin, add the yellow wax and the lard, and continue the heat until liquefied, then strain the liquid through muslin, and allow it to congeal with occasional stirring.

In cold weather *five hundred and thirty grammes* of lard and *one hundred and twenty grammes* of yellow wax may be used.

Preparation—Linimentum Terebinthinæ.

CERII OXALAS

Cerium Oxalate

Cerii Oxal.

A mixture of the oxalates of cerium, didymium, lanthanum, and other associated elements.

Cerium Oxalate is a fine white or slightly pink powder, without odor or taste; permanent in the air.

It is insoluble in water, alcohol, ether, and in solutions of potassium or sodium hydroxide; insoluble in cold, diluted sulphuric or hydrochloric acid, but dissolved by these acids when heated.

When heated to redness it is decomposed, leaving not less than 47 per cent. of a reddish-brown residue.

Boil Cerium Oxalate with potassium hydroxide T.S.; an insoluble precipitate of white hydroxides is produced. Filter and supersaturate the filtrate with acetic acid; the addition of calcium chloride T.S. produces a white precipitate, insoluble in acetic acid but soluble in hydrochloric acid.

From a solution of Cerium Oxalate in diluted hydrochloric or sulphuric acid, potassium hydroxide T.S., added in slight excess, precipitates white hydroxides, which do not redissolve in a larger excess of the reagent, but gradually turn yellow in contact with air. Ammonium carbonate T.S. added in slight excess to a similar acid solution produces a white precipitate of the mixed carbonates of cerium and associated elements, which is somewhat soluble in a larger excess of the reagent.

Dissolve 0.1 Gm. of Cerium Oxalate in 1 mil of sulphuric acid and add 2 mils of potassium sulphate T.S.; small, colorless crystals of double sulphates of potassium and the rare-earth elements in the mixture are deposited after some time.

No effervescence occurs when Cerium Oxalate is dissolved in diluted hydrochloric acid (*carbonates*).

A solution of Cerium Oxalate (1 in 50) in diluted hydrochloric acid does not respond to the Test for heavy metals (see Part II, Test No. 3).

A solution of Cerium Oxalate (1 in 25) in hot dilute sulphuric acid (1 in 3) meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Boil 0.3 Gm. of Cerium Oxalate with 15 mils of potassium hydroxide T.S. and filter. No precipitate is produced in 5 mils of the filtrate by boiling with an excess of ammonium chloride T.S. (*aluminum*) or in another 5 mil portion of the filtrate by the addition of sodium sulphide T.S. (*zinc*).

AVERAGE DOSE—Metric, 0.2 Gm.—Apothecaries, 3 grains.

CETACEUM

Spermaceti

Cetac.

A concrete, fatty substance, obtained from the head of the sperm whale, *Physeter macrocephalus* Linné (Fam. *Physeteridæ*).

Spermaceti occurs in white, somewhat translucent, slightly unctuous masses, with a scaly, crystalline fracture, a pearly luster, a very faint odor and a bland, mild taste. It becomes yellowish in color and rancid on prolonged exposure to air.

It is insoluble in water and nearly so in cold alcohol; soluble in boiling alcohol, in ether, chloroform, carbon disulphide, or fixed or volatile oils; only slightly soluble in cold petroleum benzin.

Specific gravity: 0.938 to 0.944 at 25° C. as determined by the method given under *Cera Flava*.

It melts between 42° and 50° C.

It dissolves completely in 50 parts of boiling alcohol (*paraffin*), and the solution is neutral or not more than slightly acid to moistened litmus paper.

Warm a mixture of about 1 Gm. of Spermaceti and 10 mils of ammonia water until the Spermaceti is melted, then shake it thoroughly in a stoppered vessel for a few minutes, cool and filter. The filtrate, upon supersaturation with hydrochloric acid, may become turbid, but yields no precipitate (*stearic acid*).

CHLORALUM HYDRATUM

Hydrated Chloral

Chloral. Hydrat.—"Chloral" Chloral Hydrate

A compound of trichloraldehyde or chloral, with the elements of one molecule of water. It contains not less than 99.5 per cent. of C_2HCl_3O

$+H_2O$ or $CCl_3.COH+H_2O$ (165.4). Preserve it in tightly-stoppered bottles, in a cool place, protected from light.

Hydrated Chloral occurs in rhomboidal, colorless, transparent crystals which do not readily attract moisture. It has an aromatic, penetrating, and slightly acrid odor, and a bitterish, caustic taste. It is slowly volatilized when exposed to the air.

One Gm. of Hydrated Chloral dissolves in 0.25 mil of water, 1.3 mils of alcohol, 2 mils of chloroform, and in 1.5 mils of ether at 25° C.; very soluble in olive oil, freely soluble in oil of turpentine.

Hydrated Chloral is decomposed by caustic alkalies, alkaline earths, and ammonia, chloroform and a formate of the base being produced. When warmed with a few drops of aniline and sodium hydroxide T.S., the intensely disagreeable odor of phenylisocyanide is produced.

Gently ignite 2 Gm. of Hydrated Chloral; no inflammable vapors are evolved (distinction from *chloral alcoholate and ethyl carbamate*). On complete incineration not more than 0.05 per cent. of ash remains.

Ten mils of an alcoholic solution of Hydrated Chloral (1 in 20) does not at once redden moistened blue litmus paper, nor at once become opalescent on the addition of a few drops of silver nitrate T.S. (*hydrochloric acid and chlorides*).

Shake about 0.5 Gm. of Hydrated Chloral, at intervals of five minutes during one hour, with 5 mils of sulphuric acid in a glass-stoppered tube, which has previously been rinsed with sulphuric acid. The acid remains colorless, or very nearly so when viewed transversely in a tube of about 20 mm. diameter (*organic impurities*).

Assay—Dissolve about 4 Gm. of Hydrated Chloral, accurately weighed, in 10 mils of distilled water, add 30 mils of normal potassium hydroxide V.S., and allow the mixture to stand two minutes; then add phenolphthalein T.S., and determine the residual alkali at once by titration with normal sulphuric acid V.S. It shows not less than 99.5 per cent. of $C_2HCl_3O+H_2O$.

Each mil of normal potassium hydroxide V.S. consumed corresponds to 0.1654 Gm. of $C_2HCl_3O+H_2O$. Each gramme of Hydrated Chloral corresponds to not less than 6.02 mils of normal potassium hydroxide V.S.

Average dose—Metric, 0.5 Gm.—Apothecaries, 8 grains.

CHLOROFORMUM

Chloroform

Chlorof.

A liquid consisting of not less than 99 per cent. nor more than 99.4 per cent., by weight, of $CHCl_3$ (119.39), and not less than 0.6 per cent. nor more than 1 per cent. of alcohol. Preserve it in well-stoppered bottles, in a cool place, protected from light. Caution: Care should be used in vaporizing Chloroform in the presence of a naked flame, as noxious gases are produced.

Chloroform is a clear, colorless, mobile liquid, of a characteristic, ethereal odor, and a burning, sweet taste.

Chloroform dissolves in 210 times its volume of water; miscible with alcohol, ether, benzene, petroleum benzin, or with fixed or volatile oils.

Specific gravity: 1.474 to 1.478 at 25° C.

Chloroform is volatile at a low temperature and boils at about 61° C. It is not inflammable, but its heated vapor burns with a green flame.

Pour 20 mils of Chloroform upon a piece of clean, odorless filter paper laid flat upon a warmed glass plate, and rock the plate from side to side until the liquid is all evaporated. No foreign odor becomes perceptible as the last portions disappear from the paper, and the paper remains odorless.

Agitate 10 mils of Chloroform with 25 mils of distilled water, and allow the liquids to separate completely; the aqueous layer is neutral to litmus and separate portions of 10 mils each are not affected by a few drops of silver nitrate T.S. (*chlorides*) nor colored blue by the addition of a few drops each of potassium iodide T.S. and starch T.S. (*free chlorine*).

Transfer 40 mils of Chloroform from the container, by means of a clean pipette, to a 50 mil glass-stoppered cylinder of colorless glass having an internal diameter of about 20 mm. and previously rinsed with sulphuric acid, add 4 mils of colorless sulphuric acid and shake the mixture vigorously during five minutes. Then allow the liquids to separate completely, so that both are transparent. The Chloroform remains colorless, and the acid is colorless or very nearly so when viewed horizontally in the cylinder held in a vertical position (*impurities decomposable by sulphuric acid*).

Dilute 2 mils of the sulphuric acid, separated from the Chloroform in the preceding test, with 5 mils of distilled water; the liquid is colorless and clear, and, while hot from the mixing, emits but a faint, vinous or ethereal odor (*odorous decomposition products*). When further diluted with 10 mils of distilled water, it remains clear and is not affected within one minute by the addition of 3 drops of silver nitrate T.S. (*chlorinated decomposition compounds*).

Preparations—Aqua Chloroformi Linimentum Chloroformi Spiritus Chloroformi.

AVERAGE DOSE—Metric, 0.3 mil—Apothecaries, 5 minims.

CHONDRUS

Chondrus

Irish Moss Carrageen

The dried plant of *Chondrus crispus* (Linné) Stackhouse or of *Gigartina mamillosa* (Goodenough et Woodward) J. Agardh (Fam. *Gigartinaceæ*).

Entire plants more or less matted together, consisting of a slender stalk from which arises a series of dichotomously branching, more or less flattened segments, emarginate or deeply cleft at the tips; from 5 to 15 cm. in length, and 1 to 10 mm. in width; yellowish-white, translucent, frequently coated with a calcareous deposit which effervesces with hydrochloric acid; sometimes with fruit bodies or sporangia embedded near the apex of the segments (in *C. crispus*) or with sporangia borne on short tuberculated projections or stalks, more or less scattered over the upper portion of the segments (in *G. mamillosa*); somewhat cartilaginous; odor slight, seaweed like; taste mucilaginous, saline.

Boil one part of Chondrus for about ten minutes with 30 parts of water, replacing the water lost by evaporation; the strained liquid forms a thick jelly upon cooling. When softened in cold water Chondrus becomes gelatinous and transparent, the thallus remaining nearly smooth and uniform and not swollen except slightly at the tips; a solution made by boiling 0.3 Gm. of the drug in 100 mils of water and filtering gives no precipitate on the addition of tannic acid T.S. (*gelatin*), and when cold does not give a blue color on the addition of iodine T.S. (*starch*).

CHROMII TRIOXIDUM

Chromium Trioxide

Chrom. Triox.—"Chromic Acid" Chromic Anhydride

It contains not less than 95 per cent. of CrO_3 (100.00). Preserve it in glass-stoppered bottles. Caution: Chromium Trioxide should not be brought into contact with organic substances, as serious accidents are liable to result.

Chromium Trioxide occurs as small, needle-shaped crystals or rhombic prisms, of a dark purplish-red color and metallic luster; odorless; destructive to animal and vegetable tissues; deliquescent in moist air.

One Gm. of Chromium Trioxide dissolves in 0.6 mil of water at 25° C.; also in 0.5 mil of boiling water; when brought into contact with organic solvents (*e.g.*, alcohol), decomposition takes place, sometimes with dangerous violence.

When Chromium Trioxide is heated, it darkens, and finally becomes black, but the color is restored on cooling. At about 193° C. it fuses to a reddish-brown liquid, which, on cooling, forms a dark red, brittle mass (often enclosing cavities filled with crystals), furnishing a scarlet powder. Above 250° C. it begins to decompose into green chromic oxide and free oxygen, and, after protracted heating, leaves a residue of chromic oxide.

When warmed with hydrochloric acid, chlorine is evolved.

A solution of 1 Gm. of Chromium Trioxide in 100 mils of distilled water, previously acidulated with 3 mils of hydrochloric acid, is not rendered turbid within one minute on the addition of 1 mil of barium chloride T.S. (*sulphuric acid*).

Assay—Dissolve about 1 Gm. of Chromium Trioxide, accurately weighed in a stoppered weighing-bottle, in sufficient distilled water to make a volume of 100 mils. Mix 15 mils of this solution with 3 mils of hydrochloric acid and 2 Gm. of potassium iodide in a glass-stoppered container, agitate the mixture, allow it to stand for five minutes, then dilute it with 100 mils of distilled water and titrate with tenth-normal sodium thiosulphate V.S., starch T.S. being used as indicator. It shows not less than 95 per cent. of CrO_3.

Each mil of tenth-normal sodium thiosulphate V.S. used corresponds to 0.003333 Gm. of CrO_3. Each gramme of Chromium Trioxide corresponds to not less than 285.0 mils of tenth-normal sodium thiosulphate V.S.

CHRYSAROBINUM

Chrysarobin

Chrysarob.

A mixture of neutral principles extracted from Goa powder, a substance found deposited in the wood of *Vouacapoua Araroba* (Aguiar) Druce (Fam. *Leguminosæ*). Preserve it in well-closed containers, protected from light.

Chrysarobin is a brownish to orange-yellow, micro-crystalline powder, tasteless, odorless, and irritating to the mucous membrane.

One Gm. of Chrysarobin dissolves in 385 mils of alcohol, 12.5 mils of chloroform; 16 mils of ether, 30 mils of benzene and in 180 mils of carbon disulphide at 25° C., very slightly soluble in water, and in boiling water; it dissolves in solutions of the fixed alkali hydroxides, producing a red liquid.

It dissolves in sulphuric acid, producing a deep red solution. On pouring this liquid into water, Chrysarobin is deposited unchanged.

Incinerate about 0.5 Gm. of Chrysarobin; not more than 0.25 per cent. of ash remains.

Mix about 0.001 Gm. of Chrysarobin with 2 drops of fuming nitric acid; a red mixture is produced, which turns violet-red on the addition of a few drops of ammonia water (distinction from *chrysophanic acid*, which produces a yellow liquid).

Boil about 0.1 Gm. of Chrysarobin with 20 mils of distilled water and filter; the filtrate is neutral to litmus and is not changed in color by a few drops of ferric chloride T.S. (*chrysophanic acid*).

Preparation—Unguentum Chrysarobini.

AVERAGE DOSE—Metric, 0.03 Gm.—Apothecaries, ½ grain.

CIMICIFUGA

Cimicifuga

Cimicif.—Black Cohosh Black Snakeroot Macrotys

The dried rhizome and roots of *Cimicifuga racemosa* (Linné) Nuttall (Fam. *Ranunculaceæ*), without the presence or admixture of more than 2 per cent. of stems or foreign matter.

Rhizome horizontal, more or less branching, from 2 to 12 cm. in length, and from 1 to 2.5 cm. in thickness; externally dark brown, slightly annulate from circular scars of bud scale-leaves, the upper surface with numerous stout, erect or somewhat curved branches terminated by deep, cup-shaped scars, each of which usually shows a distinct radiate structure; inferior and lateral portions with numerous root-scars and a few short roots; fracture horny; internally whitish and mealy or dark brown and waxy, bark thin, wood distinctly radiate and of about the same thickness as the pith; odor slight; taste bitter and acrid.

Roots somewhat cylindrical or obtusely quadrangular, from 1 to 3 mm. in thickness, externally dark brown, longitudinally wrinkled; fracture short; internally bark dark brown, wood yellowish, 4- to 6-rayed.

Under the microscope, sections of the rhizome of Cimicifuga show a yellowish-brown suberized epidermis, a cortex made up of about 30 layers of starch-bearing parenchyma cells; the fibro-vascular bundles collateral, the xylem consisting of tracheæ with bordered pores, and resembling tracheids in that the ends are rather acute; wood-fibers numerous, thin-walled, strongly lignified and with simple, oblique pores, the bundles separated by starch-bearing parenchyma strands from 5 to 30 cells wide; pith cells numerous, resembling those of the cortex.

Under the microscope, sections of the root of Cimicifuga show a hairy epidermis, which becomes suberized in older roots; the cortex shows about 12 rows of starch-bearing parenchyma cells; endodermis distinct; fibro-vascular bundles 4 to 6, showing in older roots as separate collateral bundles.

The powder is light to dark brown; starch grains numerous, single or compound, the individual grains spherical or more or less polygonal, each with a somewhat central cleft, from 0.003 to 0.015 mm. in diameter; fragments showing tracheæ with bordered pores and lignified wood-fibers; irregular, yellowish-brown fragments of suberized epidermis made up of more or less tabular cells, sometimes elongated and considerably thickened.

Cimicifuga yields not more than 10 per cent. of ash.

Preparations—Extractum Cimicifugæ Fluidextractum Cimicifugæ.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

CINCHONA

Cinchona

Cinch.—Yellow Cinchona Calisaya Bark Yellow Peruvian Bark

The dried bark of *Cinchona Ledgeriana* Moens, *Cinchona Calisaya* Weddell, and of hybrids of these with other species of *Cinchona* (Fam. *Rubiaceæ*), yielding not less than 5 per cent. of the alkaloids of Cinchona.

In quills or curved pieces of variable length, bark from 3 to 5 mm. in thickness, or in small broken fragments or in transversely curved pieces from 3 to 7 mm. in thickness; externally gray, rarely brownish-gray, with numerous intersecting transverse and longitudinal fissures having nearly vertical sides, and usually with patches of foliaceous lichens with their small, brownish-black apothecia; when the outer bark is absent, the color externally is cinnamon-brown; inner surface light cinnamon-brown, finely striate; fracture of the outer bark short and granular, of the inner bark finely splintery; odor faintly aromatic; taste very bitter and somewhat astringent.

The powder is reddish-brown; bast-fibers spindle-shaped, yellowish, from 0.3 to 1.35 mm. in length, with thick, strongly lignified, lamellated walls having slit-like, oblique pores; starch grains single or 2- to 5-compound, the individual grains spherical or plano-convex and from 0.003 to 0.015 mm. in diameter; sphenoidal micro-crystals of calcium oxalate numerous.

Heat 1 Gm. of powdered Cinchona in a dry test tube; a tarry distillate forms, having a purplish color and a somewhat granular appearance.

Assay—Introduce 5 Gm. of Cinchona, in No. 40 powder, into a 500 mil flask and add 200 mils of a mixture of chloroform, 1 volume, and ether, 2 volumes. Stopper the flask, shake it well, and let it stand ten minutes. Then add 5 mils of ammonia water, shake the flask frequently for one hour, and let it stand from eight to ten hours. Now add 10 mils of distilled water, shake the mixture vigorously and when the drug has settled, decant 160 mils of the solution, representing 4 Gm. of Cinchona. Filter it through a pledget of purified cotton into a separator, and rinse both cylinder and cotton with ether. Completely extract the alkaloids from the chloroform-ether solution by shaking out repeatedly with weak sulphuric acid. Collect the acid solutions in a separator, add ammonia water until the solution is distinctly alkaline to litmus, and completely extract the alkaloids by shaking out repeatedly with chloroform. Filter each portion of chloroform as it comes from the separator through a pledget of purified cotton into a tared flask, and wash the funnel and cotton with chloroform. Evaporate the chloroform on a water bath, add 5 mils of alcohol to the residue, and again evaporate. Repeat the evaporation with alcohol and dry the residue at 100° C. to constant weight. The weight will be the amount of total alkaloids from 4 Gm. of Cinchona (see Proximate Assays, Part II).

Preparations—Fluidextractum Cinchonæ Tinctura Cinchonæ.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

CINCHONA RUBRA

Red Cinchona

Cinch. Rub.—Red Peruvian Bark

The dried bark of *Cinchona succirubra* Pavon (Fam. *Rubiaceæ*), or of its hybrids, yielding not less than 5 per cent. of the alkaloids of Red Cinchona.

In quills or curved pieces of variable length, bark from 2 to 4 mm. in thickness, or in small broken fragments or in transversely curved pieces from 3 to 7 mm. in thickness; externally gray, grayish-brown, or reddish-brown, more or less rough from corky protuberances, occasionally with transverse fissures which are rarely numerous or much intersected, and having their sides sloping, and with occasional patches of foliaceous lichens; inner surface reddish or orange-brown, distinctly striate; fracture short and granular in the outer bark, shortly and rather coarsely splintery in the inner bark; odor slight; taste very bitter and astringent.

The powder is light brown; bast-fibers and sphenoidal micro-crystals of calcium oxalate, resembling those in cinchona; starch grains resembling those of cinchona relatively few, from 0.003 to 0.01 mm. in diameter.

Heat 1 Gm. of powdered Red Cinchona in a dry test tube; a tarry distillate forms having a bright red color.

Assay—Proceed as directed under *Cinchona*, using 5 Gm. of Red Cinchona.

Preparation—Tinctura Cinchonæ Composita.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

CINCHONIDINÆ SULPHAS

Cinchonidine Sulphate

Cinchonid. Sulph.

The sulphate $[(C_{19}H_{22}ON_2)_2.H_2SO_4+3H_2O=740.53]$ of an alkaloid obtained from the bark of several species of cinchona. Preserve it in well-closed containers protected from light.

Cinchonidine Sulphate occurs in white, glistening, silky needles or prisms; odorless and having a very bitter taste; permanent in the air.

One Gm. of Cinchonidine Sulphate dissolves in 65 mils of water, 90 mils of alcohol, and in 620 mils of chloroform at 25° C.; also in 22 mils of water at 80° C., and in 41 mils of alcohol at 60° C.; nearly insoluble in ether.

A saturated aqueous solution of the salt is neutral or faintly alkaline to litmus and is lævorotatory.

When anhydrous it melts at about 200° C. with partial decomposition.

An aqueous solution of Cinchonidine Sulphate yields with barium chloride T.S., a white precipitate, insoluble in hydrochloric acid.

Add ammonia water to 25 mils of an aqueous solution of the salt, 1 in 80; a white precipitate (*cinchonidine*) is produced, which is but slightly soluble in ammonia water, but which, when freshly precipitated, dissolves in 5 mils of ether, the greater part afterwards separating in crystals.

When dried to constant weight at 100° C., Cinchonidine Sulphate loses not more than 12 per cent. of its weight.

Incinerate about 1 Gm. of Cinchonidine Sulphate; not more than 0.1 per cent of ash remains.

Add 2 mils of sulphuric acid to about 0.1 Gm. of the salt; not more than a faint, yellow color is developed (*readily carbonizable impurities*).

Ten mils of a solution of the salt (1 in 1000) in diluted sulphuric acid exhibits only a faint, blue fluorescence.

Macerate 0.5 Gm. of Cinchonidine Sulphate, with frequent agitation, at the ordinary temperature, with 20 mils of distilled water, then add 0.5 Gm. of potassium and sodium tartrate and continue the maceration with repeated agitation for one hour at 15° C., and filter the mixture. The addition of 1 drop of ammonia water to the filtrate produces not more than a slight turbidity (*cinchonine or quinidine sulphate*).

AVERAGE DOSE—Metric, 0.15 Gm.—Apothecaries, 2½ grains.

CINCHONINÆ SULPHAS

Cinchonine Sulphate

Cinchonin. Sulph.

The sulphate [$(C_{19}H_{22}ON_2)_2.H_2SO_4+2H_2O=722.51$] of an alkaloid obtained from the bark of several species of cinchona. Preserve it in well-closed containers protected from light.

Cinchonine Sulphate occurs in white, lustrous prismatic crystals; odorless, and having a very bitter taste; permanent in the air.

One Gm. of Cinchonine Sulphate dissolves in 60 mils of water, 12.5 mils of alcohol, 47 mils of chloroform, and in 3230 mils of ether at 25° C.; also in 33 mils of water at 80° C. and in 7 mils of alcohol at 60° C.

A saturated aqueous solution of the salt is neutral or slightly alkaline to litmus and is dextrorotatory.

An aqueous solution of Cinchonine Sulphate (1 in 100) yields with barium chloride T.S. a white precipitate insoluble in hydrochloric acid.

Dried to constant weight at 100° C. Cinchonine Sulphate loses not more than 5 per cent. of its weight.

Incinerate about 1 Gm. of Cinchonine Sulphate; not more than 0.1 per cent. of ash remains.

Ten mils of a solution of the salt (1 in 1000) in diluted sulphuric acid exhibits only a slight, blue fluorescence.

One-tenth Gm. of the powdered salt dissolves completely or nearly so when shaken with 10 mils of chloroform at ordinary temperatures (*quinine or cinchonidine sulphate*).

Add 0.1 Gm. of the salt to 2 mils of sulphuric acid; it imparts not more than a faint, yellow tinge to the acid (*readily carbonizable, organic impurities*).

AVERAGE DOSE—Metric, 0.15 Gm.—Apothecaries, 2½ grains.

CINNAMOMUM SAIGONICUM

Saigon Cinnamon

Cinnam. Saigon.

The dried bark of an undetermined species of *Cinnamomum* (Fam. *Lauraceæ*).

In quills attaining a length of 30 cm., and from 3 to 30 mm. in diameter; the bark from 0.5 to 3 mm. in thickness; outer surface light brown to dark purplish-brown with grayish patches of foliaceous lichens and numerous bud-scars; finely wrinkled, especially the bark of younger twigs, otherwise more or less rough from corky patches surrounding the lenticels; inner surface reddish-brown to dark brown, granular, and slightly striate; fracture short; inner bark porous, owing to the presence of large oil cells and mucilage cells, and separated by a continuous layer of stone cells from the outer bark; odor aromatic; taste sweetish, aromatic and pungent.

Under the microscope, sections of the older bark of Saigon Cinnamon show a thin layer of more or less lignified cork cells; a narrow layer of starch-bearing parenchyma with scattered stone cells; a nearly continuous zone, several layers wide, of stone cells, among which are small groups of bast-fibers with thickened and slightly lignified walls; a wide inner bark with medullary rays 1 to 3 cells in width, isolated bast-fibers, mucilage cells, oil cells and parenchyma, the cells of the latter either filled with starch grains or containing very small raphides of calcium oxalate; the lumina of parenchyma cells, stone cells and bast-fibers frequently filled with an amorphous reddish-brown substance, which is for the most part insoluble in the ordinary reagents. In the bark of young twigs there is an epidermal layer with a thick yellowish cuticle, fewer stone cells in the zone associated with bast-fibers, and the inner bark is narrower and with fewer secretion cells than in the older bark.

The powder is yellowish- or reddish-brown; starch grains numerous, single or compound, the individual grains being somewhat ellipsoidal or polygonal and from 0.003 to 0.02 mm. in diameter; fragments, with colorless stone cells, rather prominent, the cells being very irregular in shape and the lumina containing either air or a reddish-brown amorphous substance; bast-fibers from 0.3 to 1.5 mm. in length and usually in groups of from 2 to 20 with very thick and scarcely lignified walls; numerous cellular, reddish-brown fragments in which the oil cells are not readily distinguishable.

Saigon Cinnamon yields not less than 2 per cent. of volatile extractive, soluble in ether (see Part II, Test No. 12).

Saigon Cinnamon yields not more than 6 per cent. of ash. The amount of ash insoluble in diluted hydrochloric acid does not exceed 2 per cent. of the weight of Saigon Cinnamon taken.

Preparation—Tinctura Cinnamomi.

AVERAGE DOSE—Metric, 0.25 Gm.—Apothecaries, 4 grains.

CINNAMOMUM ZEYLANICUM

Ceylon Cinnamon

Cinnam. Zeylan.

The dried bark of cultivated trees of *Cinnamomum zeylanicum* Breyne (Fam. *Lauraceæ*), without the presence or admixture of more than 3 per cent. of the outer bark or other foreign matter.

In closely rolled double quills, composed of from 7 to 12 thin layers of separate pieces of bark, from 30 to 50 cm. in length and from 8 to 13 mm. in diameter; the bark attaining a thickness of 1 mm.; outer surface pale yellowish-brown, smooth, longitudinally striate with narrow yellowish groups of bast-fibers, and showing circular or irregular brownish patches, occasionally with perforations marking the nodes; inner surface light brown, with faint, longitudinal striations; fracture short with projecting bast-fibers; odor agreeably aromatic; taste sweetish and warmly aromatic.

Under the microscope, sections of Ceylon Cinnamon usually show no cork but an almost continuous outer layer of stone cells, among which are small groups of bast-fibers resembling those found in *Saigon Cinnamon;* in the inner bark occur numerous bast-fibers singly or in small groups, medullary rays 1 to 2 cells in width, usually with raphides of calcium oxalate; parenchyma with either reddish-brown contents or more or less filled with starch grains; scattered throughout the parenchyma occur oil secretion cells and mucilage cells.

The powder is light brown or yellowish-brown; starch grains numerous, varying from spherical to polygonal, from 0.003 to 0.02 mm. in diameter, frequently in small aggregates; bast-fibers from 0.3 to 0.8 mm. in length, usually single, spindle-shaped, with attenuated ends, the walls being very thick and but slightly lignified; colorless stone cells resembling those of *Saigon Cinnamon;* numerous cellular fragments with yellowish-brown walls or contents; cork cells few or none; calcium oxalate in raphides, from 0.005 to 0.008 mm. in length.

Ceylon Cinnamon yields not less than 0.5 per cent. of volatile extractive, soluble in ether (see Part II, Test No. 12).

Ceylon Cinnamon yields not more than 6 per cent. of ash. The amount of ash insoluble in diluted hydrochloric acid does not exceed 2 per cent. of the weight of Ceylon Cinnamon taken.

Average dose—Metric, 0.250 Gm.—Apothecaries, 4 grains.

COCAINA

Cocaine

Cocain.

An alkaloid [$C_{17}H_{21}O_4N$ or $C_8H_{13}(C_6H_5CO)ON.COOCH_3 = 303.18$] obtained from *Erythroxylon Coca* Lamarck and its varieties (Fam. *Erythroxylaceæ*). Preserve it in well-closed containers protected from light.

Cocaine occurs in large, colorless, four-sided, or six-sided monoclinic prisms, or as a white crystalline powder; odorless.

One Gm. of Cocaine dissolves in about 600 mils of water, 6.5 mils of alcohol, 0.7 mil of chloroform, 3.5 mils of ether and in 12 mils of olive oil at 25° C.; also in 270 mils of water at 80° C.; very soluble in warm alcohol; slightly soluble in liquid petrolatum.

It melts between 96° and 98° C.

On neutralizing carefully an alcoholic solution of Cocaine with diluted hydrochloric acid and evaporating the solution to dryness, the residue responds to the tests for identity and purity under *Cocainæ Hydrochloridum.*

Average dose—Metric, 0.015 Gm.—Apothecaries, ¼ grain.

COCAINÆ HYDROCHLORIDUM

Cocaine Hydrochloride

Cocain. Hydrochl.—Cocaine Chloride Cocainum hydrochloricum P. I.

The hydrochloride [$C_{17}H_{21}O_4N.HCl = 339.65$] of the alkaloid cocaine.

Cocaine Hydrochloride occurs in colorless, transparent, monoclinic prisms; in flaky, lustrous leaflets or as a white, crystalline powder; odorless; permanent in the air.

One Gm. of Cocaine Hydrochloride dissolves in 0.4 mil of water, 3.2 mils of alcohol, and in 12.5 mils of chloroform at 25° C.; also in 2 mils of alcohol at 60° C.; soluble in glycerin, insoluble in ether.

An aqueous solution of the salt (1 in 20) is neutral to litmus and is lævorotatory.

It melts between 183° and 191° C., the higher melting point indicating greater purity.

Silver nitrate T.S. produces in an aqueous solution of the salt (1 in 100), a white precipitate insoluble in nitric acid.

Add 5 drops of a solution of chromium trioxide (1 in 20) to 5 mils of a solution of Cocaine Hydrochloride (1 in 50); a yellow precipitate is produced which redissolves on shaking the mixture; on now adding 1 mil of hydrochloric acid, a permanent, orange-colored, crystalline precipitate is formed.

Dissolve about 0.1 Gm. of the salt in 1 mil of sulphuric acid; not more than a slight yellow tint is produced (*readily carbonizable impurities*). Keep this solution at a temperature of 100° C. for five minutes, then cautiously mix it with

2 mils of distilled water; the aromatic odor of methyl benzoate is noticeable and, on cooling, crystals of benzoic acid form, which dissolve on the careful addition of alcohol.

A solution of about 0.01 Gm. of Cocaine Hydrochloride in 1 mil of distilled water yields, on the addition of 2 mils of tenth-normal potassium permanganate V.S., a violet, crystalline precipitate which appears brownish-violet when collected on a filter, and shows characteristic, crystalline aggregates under a low power microscope.

Incinerate 0.5 Gm. of Cocaine Hydrochloride; no weighable ash remains.

Mix 5 mils of an aqueous solution of the salt (1 in 50) with 0.3 mil of normal sulphuric acid V.S. and 0.1 mil of tenth-normal potassium permanganate V.S.; a violet tint is produced which does not disappear entirely within half an hour (*cinnamyl-cocaine*).

Dilute 5 mils of an aqueous solution of the salt (1 in 50), in a beaker, with distilled water to make 85 mils, add 0.2 mil of ammonia water and stir the solution vigorously during five minutes, with occasional rubbing of the sides of the beaker with a stirring rod. A crystalline precipitate of cocaine is formed and the supernatant liquid is clear (*isatropyl-cocaine*). The presence of 0.5 per cent. of isatropyl-cocaine will prevent the formation of nearly all of the precipitate, and will cause the supernatant liquid to be milky.

AVERAGE DOSE—Metric, 0.015 Gm.—Apothecaries, ¼ grain.

COCCUS

Cochineal

The dried female of the insect *Coccus cacti* Linné (Fam. *Coccidæ*), enclosing the young larvæ.

Somewhat ovate in outline, convex above, concave beneath, from 3.5 to 5 mm. in length, consisting of from 9 to 12 segments; externally grayish-purple or grayish; in the shell-like, somewhat horny abdomen lie numerous larvæ less than 1 mm. in diameter; the mature larvæ with antennæ consisting of eight joints, 3 pairs of legs, the lower having from 6 to 8 segments, and a characteristic beak or rostrum composed of 4 thread-like parts which pair off into two coils.

Cochineal is easily pulverizable and yields a dark red powder, with a characteristic odor and slightly bitter taste. When masticated it colors the saliva red, due to the coloring principle, carminic acid, which is soluble in water, alcohol, or alkalies and slightly soluble in ether, but insoluble in fixed or volatile oils. Alkalies change the color of solutions of Cochineal to purple, while acids change it to reddish-yellow. When Cochineal is macerated in water no insoluble powder separates.

Cochineal yields not more than 6 per cent. of ash.

CODEINA

Codeine

Codein.—Methylmorphine

An alkaloid [$C_{18}H_{21}O_3N+H_2O$ or $C_{17}H_{18}(CH_3)O_3N+H_2O=317.19$] obtained from opium, or prepared from morphine by methylation. Preserve it in well-closed containers protected from light.

Codeine occurs in colorless, translucent, rhombic prisms, or as a crystalline powder; odorless and slightly efflorescent in warm air.

One Gm. of Codeine dissolves in 120 mils of water, 2 mils of alcohol, 0.5 mil of chloroform, and in 18 mils of ether at 25° C.; also in 1.2 mils of alcohol at 60° C.

A saturated aqueous solution of Codeine is alkaline to litmus and is lævorotatory.

Codeine, rendered anhydrous, melts between 154° and 156° C.

When heated in an insufficient amount of water for complete solution, it melts to oily drops, which crystallize on cooling.

Sulphuric acid containing 0.005 Gm. of selenous acid in each mil produces with Codeine a green color, changing rapidly to blue, then slowly back to grass-green.

About 0.01 Gm. of Codeine dissolves in 5 mils of sulphuric acid (free from nitrous compounds) without showing other than a transient, pinkish tint; on the addition of a drop of ferric chloride T.S., the solution becomes blue when warmed and changes to red on the further addition of a drop of nitric acid.

When dried to constant weight at 80° C., Codeine loses not more than 6 per cent. of its weight. No weighable ash remains on incinerating 0.5 Gm. of Codeine.

Dissolve about 0.05 Gm. of potassium ferricyanide in 10 mils of distilled water, add 1 drop of ferric chloride T.S., and then 1 mil of a neutral or slightly acid aqueous solution of Codeine (1 in 100), made with the aid of sulphuric acid; no blue color is produced at once (*morphine*).

AVERAGE DOSE—Metric, 0.03 Gm.—Apothecaries, ½ grain.

CODEINÆ PHOSPHAS

Codeine Phosphate

Codein. Phos.

The phosphate [$C_{18}H_{21}O_3N.H_3PO_4+2H_2O$ or $C_{17}H_{18}(CH_3)O_3N.H_3PO_4+2H_2O=433.27$] of the alkaloid codeine. It yields not less than 67 per cent. of anhydrous codeine ($C_{18}H_{21}O_3N$). Preserve it in well-closed containers, protected from light.

Codeine Phosphate occurs in fine, white, needle-shaped crystals, or as a crystalline powder; odorless and very efflorescent.

One Gm. of Codeine Phosphate dissolves in 2.3 mils of water, 325 mils of alcohol, 4500 mils of chloroform, and in 1875 mils of ether at 25° C.; also in 0.5 mil of water at 80° C. and in 125 mils of boiling alcohol.

Its aqueous solution (1 in 20) is acid to litmus.

Silver nitrate T.S. produces in an aqueous solution of the salt, previously neutralized with ammonia water, a yellow precipitate which is soluble in diluted nitric acid and in ammonia water.

Separate portions of 10 mils each of an aqueous solution of Codeine Phosphate (1 in 100), acidulated with nitric acid, are not rendered turbid at once on the addition of a few drops of barium chloride T.S. (*sulphates*), or opalescent by a few drops of silver nitrate T.S. (*chlorides*).

Assay—Dissolve about 0.5 Gm. of Codeine Phosphate, accurately weighed, in 10 mils of distilled water, add 10 mils of potassium hydroxide T.S. and shake the mixture with three successive portions of 15 mils each of chloroform, or a sufficient quantity to complete the extraction. The combined chloroform solutions, carefully evaporated to dryness on a water bath, yield, after drying to a constant weight at 110° C., not less than 67 per cent. of anhydrous codeine.

In other respects Codeine Phosphate responds to the tests of identity and purity under *Codeina*, omitting the melting point and ash test.

AVERAGE DOSE—Metric, 0.03 Gm.—Apothecaries, ½ grain.

CODEINÆ SULPHAS

Codeine Sulphate

Codein. Sulph.

The sulphate [$(C_{18}H_{21}O_3N)_2.H_2SO_4+5H_2O$ or $(C_{17}H_{18}(CH_3)O_3N)_2.H_2SO_4+5H_2O=786.52$] of the alkaloid codeine. Preserve it in well-closed containers, protected from light.

Codeine Sulphate occurs in long, glistening, white, needle-shaped crystals or rhombic prisms, or as a crystalline powder; odorless and efflorescent in the air.

One Gm. of Codeine Sulphate dissolves in 30 mils of water and in 1280 mils of alcohol at 25° C.; also in 6.5 mils of water at 80° C. and in 440 mils of alcohol at 60° C.; insoluble in chloroform or ether.

Its aqueous solution (1 in 40) is neutral or not more than faintly acid to litmus.

Barium chloride T.S. produces, in an aqueous solution of the salt, a white precipitate which is insoluble in hydrochloric acid.

When dried to constant weight at 100° C., Codeine Sulphate loses not more than 12 per cent. of its weight.

In other respects the salt responds to the tests for identity and purity under *Codeina*, omitting the melting point.

AVERAGE DOSE—Metric, 0.03 Gm.—Apothecaries, $\frac{1}{2}$ grain.

COLCHICI CORMUS

Colchicum Corm

Colch. Corm.—Colchicum Root

The dried corm of *Colchicum autumnale* Linné (Fam. *Liliaceæ*), yielding not less than 0.35 per cent. of colchicine.

Usually in reniform, transverse or in ovate, longitudinal slices; from 2 to 5 mm. in thickness; flat surfaces whitish, slightly roughened, and of a crystalline appearance under a hand lens; epidermis thin, light brown and finely wrinkled; fracture short and mealy, odor slight; taste bitter and somewhat acrid.

The powder is light brown or grayish-brown; starch grains numerous, single or 2- to 6-compound, the individual grains varying from spherical or ovoid to polygonal, and marked with a triangular or star-shaped, central cleft from 0.003 to 0.03 mm. in diameter; tracheæ few and with spiral or scalariform thickenings; occasional fragments of epidermal cells with thin, reddish-brown walls.

Colchicum Corm yields not more than 6 per cent. of ash.

Assay—Proceed as directed under *Colchici Semen*, using 15 Gm. of Colchicum Corm.

Preparation—Extractum Colchici Cormi.

AVERAGE DOSE—Metric, 0.25 Gm.—Apothecaries, 4 grains.

COLCHICI SEMEN

Colchicum Seed

Colch. Sem.—Colchici semen P. I.

The dried seeds of *Colchicum autumnale* Linné (Fam. *Liliaceæ*), yielding not less than 0.45 per cent. of colchicine.

Ovoid or irregularly globular, more or less pointed at the hilum; from 2 to 3 mm. in diameter; when fresh, several seeds cohering; externally dark brown, finely pitted; tough and of almost bony hardness; internally whitish or light brown; nearly inodorous; taste bitter and somewhat acrid.

Under the microscope, transverse sections of Colchicum Seed show a seed-coat of a few more or less collapsed cells with thin reddish-brown walls; an endosperm, making up most of the seed, consisting of cells with rather thick, porous walls, the lumina containing oil globules and aleurone grains, the latter being from 0.003 to 0.015 mm. in diameter; a small embryo, the beaked portion, or caruncle, containing numerous, somewhat ovoid, ellipsoidal or polygonal starch grains, from 0.005 to 0.016 mm. in diameter.

Colchicum Seed yields not more than 8 per cent. of ash.

Assay—Introduce 15 Gm. of Colchicum Seed, in No. 60 powder, into a 500 mil flask, and add 10 mils of solution of lead subacetate and 290 mils of distilled water. Weigh the flask and contents, and digest the mixture at from 60° to 70° C. for three hours, with occasional agitation. Cool, add distilled water to restore the original weight and filter off 200 mils. Add 0.75 Gm. of sodium phosphate to the clear filtrate, shake the mixture frequently during half an hour, and filter off 100 mils representing 5 Gm. of Colchicum Seed. Shake out the alkaloid from the filtrate with chloroform until completely extracted, as shown by testing with iodine T.S. (in place of the usual mercuric potassium iodide T.S.), and evaporate the chloroform solution; add about 1 mil of alcohol and again evaporate. Repeat this operation once more and dry the residue to constant weight at 100° C. To this weighed residue contained in a flask add 5 mils of tenth-normal sulphuric acid V.S. and 5 mils of distilled water and heat the mixture for ten minutes at 70° C. Now filter the liquid through a pledget of purified cotton, wash the flask and cotton with distilled water, reject the filtrate and washings and remove as much of the water from the cotton as possible. Dissolve any insoluble residue that may remain on the cotton by washing it first with a little alcohol and then with ether; collect the alcohol-ether washings in the flask, evaporate, and dry the residue to constant weight at 100° C. Deduct this weight from the weight of residue previously obtained. The difference will be the weight of colchicine obtained from 5 Gm. of Colchicum Seed (see Proximate Assays, Part II).

Preparations—Fluidextractum Colchici Seminis   Tinctura Colchici Seminis.

AVERAGE DOSE—Metric, 0.2 Gm.—Apothecaries, 3 grains.

COLCHICINA

Colchicine

An alkaloid [$C_{22}H_{25}O_6N = 399.21$] obtained from colchicum. Preserve it in well-closed containers, protected from light.

Colchicine occurs in pale yellow, amorphous scales, or as a pale yellow, amorphous powder, turning darker on exposure to light; odorless or nearly so. *Great caution must be used in tasting it and then only in very dilute solutions.*

One Gm. of Colchicine dissolves in 22 mils of water, 220 mils of ether, and in 100 mils of benzene at 25° C.; also in 21 mils of water at 80° C.; freely soluble in alcohol or chloroform; insoluble in petroleum benzin.

Its aqueous solution (1 in 30) is neutral to litmus, lævorotatory, and of a yellow color, which is intensified by the addition of mineral acids.

It melts between 142° and 146° C.

Stir about 0.001 Gm. of Colchicine with a few drops of sulphuric acid; a lemon-yellow color is produced, which, on the addition of a drop of nitric acid, changes to greenish-blue, then to red and finally to yellow. On adding an excess of potassium hydroxide T.S., the color is changed to red.

The addition of 2 drops of ferric chloride T.S. to 5 mils of an aqueous solution of Colchicine (1 in 100) produces no color (*colchiceine*), but, on heating, a brownish-red color is developed, which changes to brownish-black; 1 drop of ferric chloride T.S. added to 1 mil of an alcoholic solution of Colchicine (1 in 20) produces a garnet-red color at once.

No weighable ash remains on incinerating 0.1 Gm. of Colchicine.

Heat a mixture of about 0.01 Gm. of Colchicine, 2 mils of potassium hydroxide T.S., and 1 drop of aniline; no odor of phenylisocyanide develops (*chloroform*).

Average dose—Metric, 0.0005 Gm.—Apothecaries, 1/120 grain.

COLLODIUM

Collodion

Collod.

Pyroxylin, *forty grammes*	40 Gm.
Ether, *seven hundred and fifty milliliters*	750 mils
Alcohol, *two hundred and fifty milliliters*	250 mils
To make about *one thousand milliliters*	1000 mils

Add the alcohol to the pyroxylin contained in a suitable bottle, shake the mixture thoroughly, then introduce the ether, and again shake the mixture until the pyroxylin is dissolved. Cork the bottle well and set it aside until the liquid becomes clear. Finally decant the clear portion from any sediment which may have deposited, and transfer it to containers which must be well closed.

Keep the Collodion in a cool place remote from fire.

Collodion is a clear, or slightly opalescent, syrupy liquid; colorless, or slightly yellowish and having the odor of ether. It is highly inflammable. When exposed to the air in a thin layer it leaves a transparent, tenacious film.

Specific gravity: 0.765 to 0.775 at 25° C.

When mixed with an equal volume of distilled water, a viscid, stringy mass separates; the aqueous liquid is not acid to litmus.

Assay—Introduce about 10 mils of Collodion into a flask; stopper and weigh accurately, then warm it on a water bath and add 10 mils of distilled water, drop by drop, with constant stirring. Evaporate the mixture on a water bath and dry the residue to constant weight at 110° C. The pyroxylin so obtained corresponds to not less than 5.1 per cent. of the Collodion taken, equal to about 4 Gm. of pyroxylin in 100 mils of Collodion at 25° C. The pyroxylin obtained burns rapidly, with a yellow flame.

Preparation—Collodium Flexile.

COLLODIUM CANTHARIDATUM

Cantharidal Collodion

Collod. Canth.—Blistering Collodion Vesicating Collodion

Cantharides, in fine powder, *sixty grammes*	60 Gm.
Glacial Acetic Acid, *five milliliters*	5 mils
Flexible Collodion, *eighty-five grammes*	85 Gm.
Acetone, *a sufficient quantity,*	
To make *one hundred grammes*	100 Gm.

Mix the cantharides with *fifty-five mils* of acetone, to which the glacial acetic acid has been added, and set the mixture aside in a closely-covered container for twenty-four hours. Then transfer it to a percolator and continue the percolation with acetone until the drug is practically exhausted. Reduce the percolate by distillation on a water bath, in a tared flask, to *fifteen grammes* and, when cold, dissolve this concentrated extract in *eighty-five grammes* of flexible collodion. Finally allow the solution to stand for several hours, and decant the clear liquid from any sediment which may have deposited, and transfer the product to containers, which must be well-closed.

Keep Cantharidal Collodion in a cool place, remote from fire.

COLLODIUM FLEXILE

Flexible Collodion

Collod. Flex.

Collodion, *nine hundred and fifty grammes*	950 Gm.
Camphor, *twenty grammes*	20 Gm.
Castor Oil, *thirty grammes*	30 Gm.
To make *one thousand grammes*	1000 Gm.

Weigh the ingredients, successively, into a tared bottle and shake the mixture until the camphor is dissolved. Keep the product in well-closed containers, in a cool place, remote from fire.

Preparation—Collodium Cantharidatum.

COLOCYNTHIS

Colocynth

Colocyn.—Colocynth Pulp Bitter Apple Colocynth Apple

The dried pulp of the fruit of *Citrullus Colocynthis* (Linné) Schrader (Fam. *Cucurbitaceæ*), without the presence or admixture of more than 5 per cent. of seeds or more than 2 per cent. of epicarp.

Fruits, before the removal of the seeds, nearly globular, from 4 to 7 cm. in diameter, usually more or less crushed and in broken pieces, with occasional patches of the nearly smooth epicarp; yellowish-white or brownish; light, spongy; separable longitudinally when entire into three carpels, each containing, near the outer surface, the ovoid, compressed, yellowish seeds; odor slight; taste intensely bitter.

The powder is yellowish-white or buff, consisting chiefly of fragments of parenchyma cells and an occasional fragment with tracheæ; very few lignified tissues of the seed-coat, showing the characteristic stone cells which are nearly isodiametric, irregular, with either straight or undulate walls that are strongly lignified and possess simple pores; globules of fixed oil and aleurone grains very few.

Powdered Colocynth must be made from colocynth pulp containing not more than 5 per cent. of seeds and, upon extraction with purified petroleum benzin, yields not more than 2 per cent. of fixed oil.

Colocynth yields not more than 15 per cent. of ash.

Preparations—Extractum Colocynthidis Extractum Colocynthidis Compositum (from Extract) Pilulæ Catharticæ Compositæ (from Compound Extract).

AVERAGE DOSE—Metric, 0.06 Gm.—Apothecaries, 1 grain.

COPAIBA

Copaiba

Copaib.—Balsam of Copaiba Copaiva

An oleoresin derived from South American species of *Copaiba* (Fam. *Leguminosæ*).

Copaiba is a pale yellow to brownish-yellow, more or less viscid liquid, either without fluorescence or with only a slightly greenish fluorescence; having a peculiar, aromatic odor, and a persistent, bitter, and acrid taste.

It is insoluble in water and partly soluble in alcohol. Soluble, showing not more than a slight opalescence, in dehydrated alcohol, carbon disulphide, or in fixed or volatile oils; completely soluble in chloroform or ether and also soluble in an equal volume of petroleum benzin, a further addition of the solvent producing a flocculent precipitate.

Specific gravity: 0.940 to 0.995 at 25° C.

When heated on a water bath, no odor of oil of turpentine is evolved; and when all of the volatile oil has been driven off, a hard and brittle resin remains, weighing not less than 36 per cent. of the original weight of the Copaiba taken (*paraffin or fatty oils*).

To about 1 Gm. of Copaiba, accurately weighed, add 50 mils of alcohol, and 1 mil of phenolphthalein T.S., then titrate the solution with half-normal potassium hydroxide V.S. It shows an acid value of not less than 28 nor more than 95.

Dissolve 3 or 4 drops of the volatile oil separated from Copaiba by distillation with steam, in 3 mils of glacial acetic acid, mix the solution with 1 drop of a freshly prepared aqueous solution of sodium nitrite (1 in 10), and carefully underlay this with 2 mils of sulphuric acid. The acetic layer is not colored pink (*gurjun balsam*).

Shake 5 mils of Copaiba with 15 mils of alcohol and then heat the mixture to boiling for one minute; no oil separates after cooling and allowing it to stand for one hour (*paraffin oils*).

The volatile oil separated from Copaiba by distillation with steam does not boil below 250° C. and shows an angle of rotation in a 100 mm. tube of not less than −7° at 25° C. (*African Copaiba*).

AVERAGE DOSE—Metric, 1 mil—Apothecaries, 15 minims.

CORIANDRUM

Coriander

Coriand.—Coriander Seed

The dried ripe fruit of *Coriandrum sativum* Linné (Fam. *Umbelliferæ*), without the presence or admixture of more than 5 per cent. of other fruits, seeds, or foreign matter.

Mericarps usually coherent; cremocarp nearly globular, from 3 to 5 mm. in diameter; externally light brown or rose colored; summit with 5 calyx teeth and a short stylopodium, each mericarp with 5 prominent, straight, longitudinal, primary ribs and 4 indistinct, undulate secondary ribs; mericarps easily separated, deeply concave on the inner or commissural surface and showing in transverse section 2 vittæ (oil tubes) on the inner surface of each.

Under the microscope, sections of Coriander show an epidermis of small cells with thick walls; a layer of several rows of thin-walled more or less collapsed parenchyma separated from a broad zone of strongly lignified, sclerenchymatous fibers which extend as a continuous ring in the mesocarp of each of the mericarps; 2 or 3 layers of large, tangentially elongated, thin-walled parenchyma cells, frequently with numerous large lysigenous intercellular spaces; inner epidermis of large tabular cells, the inner yellowish walls being considerably thickened and closely coherent to the brownish cells of the seed-coat; commissural surface with 2 large, elliptical vittæ; the cells of the pericarp separated from the seed-coat and forming a large elliptical cavity; endosperm distinctly reniform in outline and consisting of tabular or polygonal thick-walled cells containing numerous large aleurone grains each with a rosette aggregate or prism of calcium oxalate.

The powder is light brown, consisting chiefly of fragments of endosperm and lignified tissues of the pericarp; calcium oxalate crystals numerous, from 0.003 to 0.01 mm. in diameter, mostly in rosette aggregates, either isolated or in aleurone grains; sclerenchymatous fibers irregularly curved, having thick, yellowish, lignified walls and numerous simple pores; numerous globules of fixed oil; fragments of light yellow vittæ few, associated with elongated polygonal epidermal cells.

Coriander yields not less than 0.5 per cent. of volatile extractive, soluble in ether (see Part II, Test No. 12).

Coriander yields not more than 7 per cent. of ash.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

COTARNINÆ HYDROCHLORIDUM

Cotarnine Hydrochloride

Cotarn. Hydrochl.—Cotarnine Chloride

Quarternary oxymethyl-oxymethylene-dihydro-isoquinoline chloride [$C_{12}H_{14}O_3NCl$ or $(CH_3O)(CH_2O_2).C_9H_6N(CH_3)Cl=255.58$] obtained by hydrolyzing narcotine, and treating the resulting cotarnine [$(CH_3O)(CH_2O_2)C_8H_5(CHO).NH(CH_3)$] with hydrochloric acid.

Cotarnine Hydrochloride occurs as a yellow, crystalline powder; odorless and deliquescent in moist air.

It is very soluble in water and alcohol, yielding yellow solutions.

Its aqueous solution (1 in 20) is neutral to litmus.

Silver nitrate T.S. when added to an aqueous solution of Cotarnine Hydrochloride produces a white precipitate insoluble in nitric acid. About 0.2 Gm. of Cotarnine Hydrochloride, dissolved in 10 mils of distilled water, yields a brown precipitate of cotarnine periodide on the addition of 10 mils of tenth-normal iodine V.S. When this precipitate is collected on a filter and dried to constant weight over sulphuric acid, it melts between 142° C. and 144° C.

Heat gradually 0.1 Gm. of Cotarnine Hydrochloride over a Bunsen burner; it is decomposed, evolving characteristic, disagreeable vapors and yielding a reddish-brown liquid, which gradually changes to a hard charred mass. No weighable ash remains on the incineration of this mass.

Dissolve about 0.5 Gm. of Cotarnine Hydrochloride in 10 mils of distilled water and add 2 mils of an aqueous solution of sodium hydroxide (15 per cent.). A milk-white precipitate is produced which dissolves on agitation, but is reprecipitated from the solution after standing for some time, leaving the supernatant liquid clear and but faintly yellow.

Average dose—Metric, 0.06 Gm.—Apothecaries, 1 grain.

CREOSOTI CARBONAS

Creosote Carbonate

Creosot. Carb.

A mixture of the carbonates of various constituents of creosote, chiefly guaiacol and creosol.

Creosote Carbonate is a clear, colorless or yellowish, viscid liquid, odorless, and tasteless, or having a slight odor and taste of creosote. On prolonged exposure to a low temperature, crystals of guaiacol carbonate separate, which redissolve on warming.

Creosote Carbonate is insoluble in water and freely soluble in alcohol, soluble in petroleum benzin or fixed oils; it is miscible with chloroform or benzene.

Specific gravity: 1.145 to 1.170 at 25° C.

Heat about 0.5 mil of Creosote Carbonate for a few minutes with 10 mils of alcoholic potassium hydroxide T.S., and cool the mixture; a crystalline precipitate forms, which effervesces with acids.

Incinerate about 1 Gm. of Creosote Carbonate; not more than 0.1 per cent. of ash remains.

A saturated alcoholic solution of Creosote Carbonate is neutral to moistened litmus paper, and acquires only a yellow color on the addition of ferric chloride T.S. (*creosote*).

Heat 25 mils of Creosote Carbonate on a water bath for half an hour with a solution of 15 Gm. of potassium hydroxide in 100 mils of alcohol, then evaporate the alcohol and mix the residue with an excess of hydrochloric acid; a liquid composed of two layers is obtained. On now separating the dark layer of creosote and shaking it with successive portions of 10 mils each of distilled water until the washings are only slightly acid to litmus, it has the boiling point given under *Creosotum*; the distillate, after separation of adhering water, responds to the remaining tests of identity and purity under *Creosotum*.

Average dose—Metric, 1 Gm.—Apothecaries, 15 grains.

CREOSOTUM

Creosote

Creosot.—Creasote

A mixture of phenols and phenol derivatives, chiefly guaiacol and creosol, obtained during the distillation of wood-tar. Preserve it in tightly-stoppered, dark amber-colored bottles.

Creosote is an almost colorless or yellowish, highly refractive, oily liquid, having a penetrating, smoky odor, and a burning, caustic taste; it does not readily become brown on exposure to light.

Creosote is slightly soluble in water; it is miscible with alcohol, ether, or fixed or volatile oils.

It is neutral or faintly acid to litmus.

Specific gravity: not below 1.073 at 25° C.

It begins to distil between 195° and 200° C. and not less than 80 per cent. by volume distils between 200° and 220° C.

Creosote is inflammable, burning with a luminous, smoky flame.

Add 1 drop of ferric chloride T.S. to 10 mils of a saturated aqueous solution of Creosote; the liquid develops a violet-blue color, which is very transient; it then clouds almost instantly, the color passing rapidly from a grayish-green to a muddy brown, with finally the formation of a brown precipitate.

Mix equal volumes of Creosote and collodion in a dry test tube; no permanent coagulum is produced *(phenol and so-called "coal-tar creosote")*.

Mix 4 mils of Creosote with 4 mils of glycerin; a clear mixture results, from which a creosotic layer, equal to or greater in volume than the Creosote taken, separates on the addition of 1 mil of water (*"coal-tar creosote"*).

Two mils of Creosote requires not less than 10 mils nor more than 18 mils of normal sodium hydroxide V.S. to produce a clear liquid. This liquid remains unclouded on diluting with 50 mils of distilled water *(hydrocarbons and bases)*.

Shake gently 1 mil of Creosote with 2 mils of petroleum benzin and 2 mils of freshly prepared barium hydroxide T.S., until a uniform mixture is produced. Upon complete separation three distinct layers are visible; a middle layer containing the Creosote, a benzin layer which is neither blue nor muddy, and an aqueous layer which does not acquire a red tint *(cærulignol and some other high-boiling constituents of wood-tar)*.

Preparation—Aqua Creosoti.

AVERAGE DOSE—Metric, 0.25 mil—Apothecaries, 4 minims.

CRESOL

Cresol

A mixture of isomeric cresols [C_7H_8O or $C_6H_4.CH_3.OH = 108.06$] obtained from coal tar. Preserve it in well-closed containers protected from light.

Cresol occurs as a colorless or yellowish to brown-yellow, highly refractive liquid, becoming darker or assuming a reddish tint with age and on exposure to light, and having a phenol-like, sometimes empyreumatic odor.

One mil of Cresol dissolves in about 50 mils of water, usually forming a cloudy solution; it is miscible with alcohol, ether, benzene, petroleum benzin, or glycerin; it is dissolved by solutions of the fixed alkali hydroxides.

Specific gravity: 1.030 to 1.038 at 25° C.

Not less than 90 per cent. by volume of Cresol distils between 195° and 205° C.

A saturated aqueous solution of Cresol is neutral or slightly acid to litmus, and becomes blue-violet on the addition of ferric chloride T.S.

A solution of 1 mil of Cresol in 60 mils of water is not more than slightly turbid *(hydrocarbons)*.

Preparation—Liquor Cresolis Compositus.

AVERAGE DOSE—Metric, 0.05 mil—Apothecaries, 1 minim.

CRETA PRÆPARATA

Prepared Chalk

Cret. Præp.—Drop Chalk

A native form of calcium carbonate freed from most of its impurities by elutriation and containing, when dried to constant weight at 200° C., not less than 97 per cent. of $CaCO_3$ (100.07).

Prepared Chalk occurs as a white to grayish-white, very fine, amorphous powder, often formed into "conical drops"; odorless and tasteless; permanent in the air.

Prepared Chalk is almost insoluble in water; insoluble in alcohol; decomposed and dissolved by diluted acetic, hydrochloric, or nitric acid, with copious effervescence. When a weighed amount of Prepared Chalk is dissolved in diluted hydrochloric acid not more than 2 per cent. of residue remains.

Dissolve about 0.1 Gm. of Prepared Chalk in 5 mils of diluted acetic acid and filter the solution; the addition of ammonium oxalate T.S. to the filtrate yields a white precipitate, insoluble in acetic acid but soluble in hydrochloric acid.

When heated to full redness, Prepared Chalk gradually loses carbon dioxide and is converted into calcium oxide.

Assay—Proceed as directed under *Calcii Carbonas Præcipitatus.* It shows, in the dried salt, not less than 97 per cent. of $CaCO_3$.

Each gramme of dried Prepared Chalk corresponds to not less than 193.9 mils of tenth-normal oxalic acid V.S.

Preparations—Mistura Cretæ (from Compound Powder) Pulvis Cretæ Compositus.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

CUBEBA

Cubeb

Cubeb.—Cubebs

The dried, full-grown, unripe fruits of *Piper Cubeba* Linné filius (Fam. *Piperaceæ*), without the presence or admixture of more than 5 per cent. of stems or other foreign matter.

Upper portion globular, from 3 to 6 mm. in diameter, with a straight, slender stem-like portion, from 5 to 7 mm. in length; pericarp externally grayish, brownish, or bluish-black; coarsely reticulate; about 0.3 mm. in thickness, easily cut, 1-locular, 1-seeded; the immature seed attached at the base of the pericarp; odor aromatic, characteristic; taste strongly aromatic and pungent.

Under the microscope, sections of Cubeb show an epidermal layer of tabular cells with thickened, undulate outer walls, the contents being olive-green; 1 or 2 rows of parenchyma cells, the contents resembling those of the epidermal cells; a continuous layer of radiately elongated, thick-walled stone cells having numerous pores; a few layers of collapsed cells near which may occur an occasional small group of bast-fibers; a middle layer of 10 rows of cells composed chiefly of parenchyma, scattered among which are numerous secretion cells containing a volatile oil and occasionally crystals in the form of short rods, the contents of the secretion cells being colored a deep crimson upon the addition of sulphuric acid; an endocarp of small, somewhat isodiametric or polygonal stone cells with very thick porous walls; seed-coat of several rows of reddish-brown, tangentially elongated, more or less collapsed cells; perisperm of numerous thin-walled parenchyma, the cells being more or less polygonal in shape and containing either small compound starch grains, or globules of a fixed oil or occasionally a crystal of calcium oxalate.

The powder is light brown to blackish-brown, consisting of a more or less even distribution of starch-bearing cells of the perisperm and fragments of the pericarp with stone cells; starch grains numerous, single or compound, from 0.002 to 0.012 mm. in diameter; stone cells numerous in palisade-like groups, in surface view rounded or polygonal with rather prominent dark lumina and yellowish porous walls; secretion cells with a yellowish, oily content, becoming reddish on the addition of sulphuric acid; fragments of stalk few, with spiral tracheæ and groups of sclerenchymatous fibers from 0.05 to 1 mm. in length with blunt, rounded, or very much attenuated ends, the walls strongly lignified and with numerous oblique pores.

Cubeb yields not less than 10 per cent. of volatile extractive, soluble in ether (see Part II, Test No. 12).

Cubeb yields not more than 8 per cent. of ash.

Preparations—Oleoresina Cubebæ Trochisci Cubebæ (from Oleoresin).

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

CUPRI SULPHAS

Copper Sulphate

Cupr. Sulph.—Cupric Sulphate

It contains not less than 62.97 per cent. nor more than 66.79 per cent. of anhydrous copper sulphate, corresponding to not less than 98.5 per cent. of the crystallized salt [$CuSO_4+5H_2O=249.72$]. Preserve it in well-closed containers.

Copper Sulphate occurs as deep blue, triclinic crystals or as a blue, granular powder; odorless, of a nauseous, metallic taste; slowly efflorescent in dry air.

One Gm. of Copper Sulphate dissolves in 2.5 mils of water, 500 mils of alcohol, and in 2.8 mils of glycerin at 25° C.; also in 0.5 mil of boiling water.

An aqueous solution of the salt (1 in 20) has a blue color, and is acid to litmus.

When heated to 30° C. the salt loses part of its water of crystallization and is converted into a pale blue, amorphous powder. More water is lost at 100° C. and finally at 200° C. a white, anhydrous powder remains. At a still higher temperature, sulphur dioxide and oxygen are given off, and a residue of black cupric oxide remains.

Place a drop of an aqueous solution of the salt (1 in 20) on a bright piece of iron; a red film of metallic copper is deposited.

Barium chloride T.S. produces a white precipitate, insoluble in hydrochloric acid, in an aqueous solution of the salt (1 in 10).

Add ammonia water to an aqueous solution of Copper Sulphate (1 in 10), drop by drop; a pale blue precipitate of cupric hydroxide forms, which redissolves in an excess of ammonia water, producing a deep azure-blue solution.

Dissolve 1 Gm. of the salt in 50 mils of distilled water, add 1 mil of diluted hydrochloric acid and pass hydrogen sulphide gas through the solution until all of the copper is precipitated. Upon evaporating the filtrate and igniting, the weight of the residue does not exceed 0.003 Gm. (*other metals*).

Assay—Dissolve about 1 Gm. of Copper Sulphate, accurately weighed, in 50 mils of distilled water and add 4 mils of acetic acid and 3 Gm. of potassium iodide and titrate the liberated iodine with tenth-normal sodium thiosulphate V.S., starch T.S. being used as indicator. It shows not less than 62.97 per cent. nor more than 66.79 per cent. of $CuSO_4$.

Each mil of tenth-normal sodium thiosulphate V.S. used corresponds to 0.015964 Gm. of $CuSO_4$. Each gramme of Copper Sulphate corresponds to not less than 39.44 mils nor more than 41.83 mils of tenth-normal sodium thiosulphate V.S.

AVERAGE DOSE—Metric, 0.25 Gm.—Apothecaries, 4 grains, as an emetic.

DECOCTA

Decoctions

Decoctions must be *freshly made from the drugs*, and, when the strength of decoctions is not otherwise directed, they are to be prepared by the following general formula:

THE DRUG, coarsely comminuted, *fifty grammes*	50 Gm.
WATER, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Introduce the drug into a suitable vessel provided with a cover, pour upon it *one thousand mils* of cold water, cover it well, and boil for fifteen minutes. Then allow it to cool to about 40° C., express, strain the expressed liquid, and pass enough cold water through the strainer to make the product measure *one thousand mils.*

Caution—The strength of decoctions of energetic or powerful substances should be specially directed by the physician.

DIACETYLMORPHINA

Diacetylmorphine

Diacetylmorph.

An alkaloid [$C_{21}H_{23}O_5N$ or $C_{17}H_{17}(O.C_2H_3O)_2ON = 369.19$] prepared from morphine by acetylization. Preserve it in well-closed containers, protected from light.

Diacetylmorphine occurs as a white, crystalline powder without odor.

One Gm. of Diacetylmorphine dissolves in about 1700 mils of water, 31 mils of alcohol, 1.4 mils of chloroform, and in 100 mils of ether at 25° C.

Its saturated alcoholic solution is alkaline to moistened litmus paper.

It melts between 171.5° and 173.5° C.

Dissolve about 0.01 Gm. of Diacetylmorphine in a few drops of nitric acid; a yellow color is produced, which gradually changes to greenish-blue. Heat about 0.1 Gm. of Diacetylmorphine with 1 mil of alcohol and 1 mil of sulphuric acid; ethyl acetate is produced, recognizable by its odor.

No weighable ash remains on incinerating 0.5 Gm. of Diacetylmorphine.

Dissolve 0.2 Gm. of Diacetylmorphine in 5 mils of distilled water with the aid of a few drops of hydrochloric acid, and pour this solution slowly into 5 mils of potassium hydroxide T.S., shaking the test tube occasionally;

a white precipitate forms, which quickly redissolves, yielding a clear solution (*other alkaloids*). On heating this solution no odor of ammonia is noticeable (*ammonium salts*).

A solution of about 0.02 Gm. of Diacetylmorphine in 2 mils of sulphuric acid is colorless (*readily carbonizable organic impurities*).

Dissolve about 0.05 Gm. of potassium ferricyanide in 10 mils of distilled water, add one drop of ferric chloride T.S. and then 1 mil of an alcoholic solution of Diacetylmorphine (1 in 100); no greenish or blue color is produced at once (*morphine*).

Dissolve 1 Gm. of Diacetylmorphine in 10 mils of distilled water and 5 mils of diluted hydrochloric acid in a porcelain dish and evaporate the solution on a water bath to a syrupy consistence (about 2 mils). Transfer this residue to a separatory funnel with the aid of 25 mils of distilled water, render it alkaline with sodium hydroxide solution (10 per cent.) and then shake it out with 3 successive portions of 15, 10 and 5 mils of chloroform, passing the chloroform solutions through a small filter previously moistened with chloroform. Carefully evaporate the combined chloroform solutions to dryness on a water bath, dissolve the residue in 10 mils of fiftieth-normal sulphuric acid V.S., add a few drops of methyl red T.S. and titrate the excess of acid with fiftieth-normal potassium hydroxide V.S. Not less than 7.5 mils of the latter is required (*foreign alkaloids*).

AVERAGE DOSE—Metric, 0.003 Gm.—Apothecaries, 1/20 grain.

DIACETYLMORPHINÆ HYDROCHLORIDUM

Diacetylmorphine Hydrochloride

Diacetylmorph. Hydrochl.—Diacetylmorphine Chloride

The hydrochloride [$C_{21}H_{23}O_5N.HCl+H_2O$ or $C_{17}H_{17}(O.C_2H_3O)_2ON.HCl+H_2O=423.68$] of the alkaloid diacetylmorphine. Preserve it in well-closed containers, protected from light.

Diacetylmorphine Hydrochloride is a white, crystalline powder without odor.

One Gm. of Diacetylmorphine Hydrochloride dissolves in 2 mils of water at 25° C.; soluble in alcohol; insoluble in chloroform or ether at 25° C.

An aqueous solution of Diacetylmorphine Hydrochloride (1 in 20) is neutral or only faintly acid to litmus.

It melts at about 230° C. with decomposition.

An aqueous solution of the salt with silver nitrate T.S. yields a white precipitate insoluble in nitric acid.

In other respects the salt responds to the tests for identity and purity under *Diacetylmorphina*, omitting the melting point.

AVERAGE DOSE—Metric, 0.003 Gm.—Apothecaries, 1/20 grain.

DIASTASUM

Diastase

A mixture containing amylolytic enzymes obtained from an infusion of malt. It converts not less than 50 times its weight of potato starch into sugars. Preserve it in well-closed containers, protected from light, heat and moisture.

Diastase occurs as a yellowish-white, amorphous powder or in translucent scales; odorless and tasteless. It converts starch into dextrin and maltose.

Diastase gradually loses its amylolytic power on keeping; this power is destroyed by heating its solutions above 85° C. or by the addition of much acid and is diminished by the presence of acids or alkalies.

Diastase is soluble in water, the solutions being more or less turbid; almost insoluble in alcohol.

Assay—Mix a quantity of potato starch, purified as directed under *Pancreatinum*, equivalent to 5 Gm. of dry starch, in a beaker with 10 mils of cold distilled water. Add 140 mils of boiling distilled water, and heat the mixture on a water bath with constant stirring for two minutes, or until a translucent, uniform paste is obtained. Cool the paste to 40° C. in a water bath previously adjusted to this temperature. Prepare a fresh solution of 0.1 Gm. of Diastase in 10 mils of distilled water at 40° C. and add it to the paste. Mix them well and maintain the same temperature for exactly thirty minutes, stirring frequently; a thin, nearly clear liquid is produced. Add at once 0.1 mil of this liquid to a previously made mixture of 0.2 mil of tenth-normal iodine V.S. and 60 mils of distilled water; no blue or reddish color is produced.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

DIGITALIS

Digitalis

Digit.—Foxglove Digitalis folium P. I.

The carefully dried leaves of *Digitalis purpurea* Linné (Fam. *Scrophulariaceæ*), without the presence or admixture of more than 2 per cent. of stems, flowers or other foreign matter. If made into the official tincture and assayed biologically the minimum lethal dose should not be greater than 0.006 mil of tincture, or the equivalent in tincture of 0.0000005 Gm. of ouabain, for each gramme of body weight of frog. Digitalis should be preserved in tightly-closed containers protected from light.

Leaves, when entire, attaining a length of 30 cm. and a breadth of 15 cm., ovate to oval, abruptly contracted into winged petioles, the latter from 5 to 10 cm. in length or, in the smaller leaves, nearly absent; margin crenate, irregular (the commercial article usually more or less crumpled and broken), thin, dull, pale green or gray and densely pubescent on the lower surfaces; upper surfaces wrinkled, sparsely hairy; the venation conspicuously reticulated; the midribs and principal veins broad and flat, often purplish, the lower veins continued into the wings of the petioles; odor slight, characteristic; taste strongly bitter.

The powder is dark green; with numerous fragments of non-glandular hairs consisting of from 2- to 8-cells (usually 2- to 5-cells), varying in length from 0.145 to 0.435 mm., some of the cells being frequently collapsed; glandular hairs few, small, with a 1- or 2-celled stalk and a 1- or 2-celled glandular head; numerous irregular fragments of lamina showing stomata and occasional water-pores and elongated fragments of veins and petioles showing fibro-vascular tissues.

Digitalis yields not more than 15 per cent. of ash.

Assay—For a method of assaying Digitalis see Biological Assays (Part II).

Preparations—Fluidextractum Digitalis Infusum Digitalis Tinctura Digitalis.

AVERAGE DOSE—Metric, 0.06 Gm.—Apothecaries, 1 grain.

ELATERINUM

Elaterin

Elaterin.

A principle obtained from elaterium, a substance deposited by the juice of the fruit of *Ecballium Elaterium* (Linné) A. Richard (Fam. *Cucurbitaceæ*).

Elaterin occurs in minute, white, hexagonal scales or prismatic crystals; odorless, and having a slightly acrid, bitter taste; permanent in the air.

One Gm. of Elaterin dissolves in 325 mils of alcohol, 15.5 mils of chloroform, 450 mils of ether, and in 310 mils of benzene at 25° C.; also in 100 mils of boiling alcohol; it is insoluble in either cold or hot water.

Its alcoholic solution is neutral to moistened litmus paper.

Mix about 0.01 Gm. of Elaterin with 1 mil of sulphuric acid; only a yellow color is produced (*readily carbonizable impurities*). On the addition of a drop of solution of formaldehyde the mixture becomes brown.

A solution of about 0.01 Gm. of Elaterin in 5 mils of melted phenol becomes crimson on the addition of a few drops of sulphuric acid and rapidly changes to scarlet.

No weighable ash remains on incinerating 0.1 Gm. of Elaterin.

Shake about 0.1 Gm. of Elaterin with a mixture of 9 mils of distilled water and 1 mil of diluted hydrochloric acid and filter; separate portions of the filtrate yield no turbidity with 0.5 mil of mercuric potassium iodide T.S. or with iodine T.S. (*alkaloids*).

Preparation—Trituratio Elaterini.

Average dose—Metric, 0.003 Gm.—Apothecaries, $^{1}/_{20}$ grain.

ELIXIR AROMATICUM

Aromatic Elixir

Elix. Arom.—Simple Elixir

Compound Spirit of Orange, *twelve milliliters*	12 mils
Syrup, *three hundred and seventy-five milliliters*	375 mils
Purified Talc, *thirty grammes*	30 Gm.
Alcohol,	
Distilled Water, each, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

To the compound spirit of orange, add enough alcohol to make *two hundred and fifty mils.* To this solution, add the syrup in several portions, agitating after each addition, and afterwards add, in the same manner, *three hundred and seventy-five mils* of distilled water. Mix the purified talc intimately with the liquid, and then filter through a wetted filter, returning the first portions of the filtrate until a transparent liquid is obtained. Lastly, wash the filter with a mixture of *one volume* of alcohol and *three volumes* of distilled water, until the product measures *one thousand mils.*

ELIXIR GLYCYRRHIZÆ

Elixir of Glycyrrhiza

Elix. Glycyrrh.—Elixir Adjuvans, U.S.P. VIII Elixir of Licorice

Fluidextract of Glycyrrhiza, *one hundred and twenty-five milliliters*	125 mils
Aromatic Elixir, *eight hundred and seventy-five milliliters*	875 mils
To make *one thousand milliliters*	1000 mils

Mix and filter.

EMETINÆ HYDROCHLORIDUM

Emetine Hydrochloride

Emet. Hydrochl.

The hydrochloride $[C_{30}H_{44}O_4N_2.2HCl = 569.31]$ of the alkaloid emetine, obtained from ipecac. It contains variable amounts of water of crystallization. Preserve it in dark amber-colored vials protected from light.

Emetine Hydrochloride occurs as a white or very slightly yellowish crystalline powder, without odor. On exposure to light it gradually darkens.

Emetine Hydrochloride is freely soluble in water or alcohol.

Its aqueous solution (1 in 20) is slightly acid to litmus.

Separate portions of an aqueous solution of the salt (1 in 100) yield precipitates with iodine T.S., mercuric potassium iodide T.S., and with platinic chloride T.S.

Sulphuric acid, containing in each mil about 0.005 Gm. of molybdic acid, when added to Emetine Hydrochloride produces a bright green color.

Silver nitrate T.S. produces in an aqueous solution of the salt (1 in 20) a white precipitate insoluble in nitric acid.

Dried to constant weight at 100° C., it loses not more than 19 per cent. of its weight.

No weighable ash remains on incinerating 0.2 Gm. of Emetine Hydrochloride.

One-tenth of 1 Gm. of the salt dissolves in 2 mils of sulphuric acid without producing more than a faintly yellow color (*readily carbonizable impurities*).

Dissolve 0.1 Gm. of Emetine Hydrochloride in 5 mils of distilled water in a separatory funnel, add to the solution 3 mils of sodium hydroxide T.S. and shake it out with 10 mil portions of ether until the residue obtained by evaporating 1 mil of the ethereal liquid, when dissolved in 1 drop of diluted hydrochloric acid and 1 mil of distilled water, no longer yields a turbidity with iodine T.S. Now acidulate the aqueous liquid with diluted sulphuric acid, then add ammonia water until alkaline and shake it with 10 mils of ether. Evaporate this ethereal liquid and add to the residue 1 mil of sulphuric acid containing about 0.005 Gm. of molybdic acid; no purple color is produced (*cephaeline*).

Average dose—Hypodermic, Metric, 0.02 Gm.—Apothecaries, ⅓ grain.

EMPLASTRUM BELLADONNÆ

Belladonna Plaster

Emp. Bellad.

An adhesive plaster containing 30 per cent. of extract of belladonna leaves and yielding not less than 0.35 per cent. nor more than 0.40 per cent. of the alkaloids from belladonna leaves.

Assay—Introduce 10 Gm. of Belladonna Plaster into a 100 mil flask. (If the plaster is spread on fabric, cut the portion to be assayed into strips, weigh it accurately, and introduce it into the flask.) Now add 50 mils of chloroform, and shake the mixture until the plaster is dissolved. Pour the chloroform solution into a 250 mil beaker and wash the cloth upon which the plaster was spread with two portions of 25 mils each of chloroform, adding the washings to the chloroform solution in the beaker. Then wash this cloth with 80 mils of alcohol containing 1 mil of ammonia water and pour the washings into the chloroform solution in the beaker. Stir the mixture gently and allow it to stand until the rubber has separated into a compact mass. Dry the cloth upon which the plaster was spread, weigh it and subtract its weight from the original weight of the plaster. Pour the chloroform-alcohol solution into a 350 mil separator, rinse the beaker and rubber with 10 mils of alcohol and add the rinsing to the separator. Then add to the separator 100 mils of distilled water, rotate until thoroughly mixed and allow it to stand until the liquids separate. Then draw off the chloroform into a second separator containing 50 mils of distilled water, shake it thoroughly and after separation draw off the chloroform into a beaker and pour the aqueous solution into the first separator. Return the chloroform solution to the second separator and shake out the contents of the first separator with two portions of 10 and 5 mils, respectively, of chloroform, adding them to the chloroform in the second separator. Completely extract the alkaloids from the chloroform solution by shaking it out repeatedly with weak sulphuric acid. Collect the acid washings in a separator and add ammonia water until the solution is decidedly alkaline to litmus, and completely extract the alkaloids by shaking out repeatedly with chloroform. Filter the chloroform solution through a pledget of cotton, evaporate it to dryness and dissolve the alkaloids from the residue in exactly 5 mils of tenth-normal sulphuric acid V.S., and titrate the excess of acid with fiftieth-normal potassium hydroxide V.S., using cochineal T.S. as indicator (see Proximate Assays, Part II).

Each mil of tenth-normal sulphuric acid V.S. consumed corresponds to 28.92 milligrammes of the alkaloids from belladonna leaves.

EMPLASTRUM CANTHARIDIS

Cantharides Plaster

Emp. Canthar.

Cantharides Cerate,
Rosin Plaster, spread on fabric, each, *a sufficient quantity.*

Spread cantharides cerate upon rosin plaster, leaving a margin around the edges. It may also be spread on muslin, paper, or other suitable material. This Plaster should not be dispensed unless it has been recently prepared.

Each square centimeter of spread plaster contains 0.1 Gm. of cantharides cerate.

EMPLASTRUM CAPSICI

Capsicum Plaster

Emp. Capsic.

Oleoresin of Capsicum,
Rubber Plaster, spread on fabric, each, *a sufficient quantity.*

Apply oleoresin of capsicum to the surface of rubber plaster so as to form a thin, even coating, leaving a margin around the edges.

Each fifteen square centimeters of spread plaster contains 0.25 Gm. of oleoresin of capsicum.

EMPLASTRUM ELASTICUM

Rubber Plaster

Emp. Elast.—Rubber Adhesive Plaster

A mixture of rubber, resins and waxes, with a filler of an absorbent powder, such as orris root or starch, mechanically mixed and spread upon cotton cloth or other fabric.

EMPLASTRUM PLUMBI

Lead Plaster

Emp. Plumb.—Diachylon Plaster

Lead Oxide, *one thousand grammes*.	1000 Gm.
Olive Oil, *one thousand grammes*.	1000 Gm.
Lard, *one thousand grammes*.	1000 Gm.
Boiling Water, *a sufficient quantity.*	

Heat the olive oil and lard by a gentle heat until liquefied in a bright copper or other suitable vessel of a capacity of not less than four times the bulk of the ingredients, sift the lead oxide, through a No. 80 sieve, upon the surface of the hot liquid and mix thoroughly. Then gradually add *three hundred and fifty mils* of boiling water, and boil the mixture, constantly stirring, with a wooden spatula, and adding sufficient boiling water, from time to time, to replace that lost by evaporation, until the mass is homogeneous and a small portion removed and dipped into cold water is found to be pliable and tenacious. Then remove it from the fire and wash several times with warm water to remove the glycerin. Finally knead the mass until it is free from water, roll it into cylinders of suitable size, and wrap them in paper.

Preparations—Emplastrum Resinæ Unguentum Diachylon.

EMPLASTRUM RESINÆ

Rosin Plaster

Emp. Res.—Rosin Adhesive Plaster Adhesive Plaster

ROSIN, in fine powder, *one hundred and forty grammes*	140 Gm.
LEAD PLASTER, *eight hundred grammes*	800 Gm.
YELLOW WAX, *sixty grammes*	60 Gm.
To make *one thousand grammes*	1000 Gm.

Melt the lead plaster and yellow wax together with a gentle heat, then add the rosin and, when melted, mix thoroughly, strain, and allow the product to cool, stirring until it stiffens.

EMPLASTRUM SINAPIS

Mustard Plaster

Emp. Sinap.—Charta Sinapis, U.S.P. VIII Mustard Paper

A uniform mixture of powdered black mustard (deprived of its fixed oil) and a solution of rubber, spread on paper, cotton cloth or other fabric. Preserve it in tightly-closed containers.

A square of 100 square centimeters contains not less than 2.5 Gm. of black mustard deprived of its fixed oil.

When moistened thoroughly with tepid water and applied to the skin, the Plaster produces a decided warmth and reddening of the skin within five minutes.

Before Mustard Plaster is applied, moisten it thoroughly with tepid water.

EMULSUM AMYGDALÆ

Emulsion of Almond

Emuls. Amygd.—Milk of Almond

SWEET ALMOND, *sixty grammes*	60 Gm.
ACACIA, in fine powder, *ten grammes*	10 Gm.
SUGAR, *thirty grammes*	30 Gm.
WATER, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Having blanched the almonds, add the acacia and sugar, and beat them in a mortar, until they are thoroughly mixed. Then rub the mass with *nine hundred mils* of water, at first very gradually added, until a uniform mixture results. Strain this into a graduated vessel, and wash the mortar and strainer with enough water to make the product measure *one thousand mils.* Mix the whole thoroughly. This preparation must not be dispensed unless it has been recently prepared.

EMULSUM ASAFŒTIDÆ

Emulsion of Asafetida

Emuls. Asafœt.—Milk of Asafetida

Asafetida, in tears or selected masses, *forty grammes*	40 Gm.
Water, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Rub the asafetida in a mortar, with *nine hundred mils* of water, at first very gradually added, until a uniform emulsion results. Then strain the mixture into a graduated vessel, and rinse the mortar and strainer with enough water to make the product measure *one thousand mils.* Mix the whole thoroughly.

Average dose—Metric, 15 mils—Apothecaries, 4 fluidrachms.

EMULSUM OLEI MORRHUÆ

Emulsion of Cod Liver Oil

Emuls. Ol. Morrh.

Cod Liver Oil, *five hundred milliliters*	500 mils
Acacia, in fine powder, *one hundred and twenty-five grammes*	125 Gm.
Syrup, *one hundred milliliters*	100 mils
Methyl Salicylate, *four milliliters*	4 mils
Water, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Thoroughly mix the acacia with the cod liver oil in a dry mortar or other suitable vessel, then add at once *two hundred and fifty mils* of water, and complete the emulsification by trituration or by the aid of a suitable mechanical device. When a thick, white, homogeneous mixture is obtained, add the methyl salicylate and the syrup with sufficient water to make the product measure *one thousand mils* and mix thoroughly.

Note—The methyl salicylate may be replaced by a suitable quantity of any other flavoring.

Average dose—Metric, 15 mils—Apothecaries, 4 fluidrachms.

EMULSUM OLEI TEREBINTHINÆ

Emulsion of Oil of Turpentine

Emuls. Ol. Tereb.

Rectified Oil of Turpentine, *fifteen milliliters*	15 mils
Expressed Oil of Almond, *five milliliters*	5 mils
Syrup, *twenty-five milliliters*	25 mils
Acacia, in fine powder, *fifteen grammes*	15 Gm.
Water, *a sufficient quantity,*	
To make *one hundred milliliters*	100 mils

Introduce the acacia into a perfectly dry bottle of sufficient capacity, add the rectified oil of turpentine and the expressed oil of almond and shake the bottle thoroughly. Then add *thirty mils* of water and incorporate it by vigorous shaking. When the oil has been completely emulsified, add first the syrup, in several portions, shaking after each addition, and then enough water, in divided portions, shaking after each addition, to make the product measure *one hundred mils*.

Average dose—Metric, 2 mils—Apothecaries, ½ fluidrachm.

ERGOTA

Ergot

Ergot.—Secale Cornutum, P. I. Ergot of Rye Spurred Rye

The carefully dried sclerotium of *Claviceps purpurea* (Fries) Tulasne (Fam. *Hypocreaceæ*), replacing the grain of rye, *Secale cereale* Linné (Fam. *Gramineæ*), without the presence or admixture of more than 5 per cent. of seeds, fruits or other foreign matter. Before storing, dry Ergot at a temperature not exceeding 70° C., and preserve it, protected from light, in tightly-closed containers to which a few drops of chloroform or carbon tetrachloride are added from time to time to prevent attacks by insects.

Cylindraceous, obscurely three-angled, tapering towards both ends, obtuse, somewhat curved, from 1 to 4.5 cm. in length and from 3 to 5 mm. in thickness; externally purplish-black, or brownish-black, longitudinally furrowed; fracture short, pinkish or reddish-white, sometimes grayish-white; odor peculiar, disagreeable, free from mustiness; taste oily and disagreeable.

Pour hot water on bruised Ergot; no ammoniacal or rancid odor develops.

The powder is grayish-brown, consisting chiefly of whitish fragments composed of false parenchyma of compacted hyphæ and a few purplish colored fragments of the outer layer of the sclerotium; mounts made in hydrated chloral T.S. or in sulphuric acid show the separation of numerous globules of a fixed oil, and many of the fragments are colored yellowish, reddish or rose-purple.

Shake 1 Gm. of the powdered drug with a mixture of 20 mils of water and one drop of hydrochloric acid, filter the mixture, make 4 mils of the filtrate alkaline with ammonia water and shake out with 10 mils of ether. Underlay 5 mils of this ethereal solution with 2 mils of sulphuric acid; a blue ring is formed at the zone of contact of the two liquids.

Ergot yields not more than 5 per cent. of ash.

Preparations—Extractum Ergotæ Fluidextractum Ergotæ.

AVERAGE DOSE—Metric, 2 Gm.—Apothecaries, 30 grains.

ERIODICTYON

Eriodictyon

Eriodict.—Yerba Santa

The dried leaves of *Eriodictyon californicum* (Hooker and Arnott) Greene (Fam. *Hydrophyllaceæ*), without the presence or admixture of more than 5 per cent. of stems or other foreign matter.

Usually in fragments; when entire, laminæ lanceolate, from 5 to 15 cm. in length, and from 1 to 3 cm. in breadth; summits acute; bases slightly tapering into short petioles; margins irregularly serrate or crenate-dentate; upper surfaces yellowish-brown, covered with a more or less glistening resin; under surfaces grayish or yellowish-white, conspicuously reticulate with greenish-yellow veins; minutely tomentose between the reticulations; thick, brittle; odor aromatic; taste balsamic, bitter, becoming sweetish.

Under the microscope, transverse sections of the laminæ of Eriodictyon show upon the upper surface large epidermal cells, the outer walls being very uneven, owing to indentations which appear as striations in surface view; glandular hairs numerous, with short 1-celled stalks and 6- to 8-celled glandular heads; palisade cells very narrow, from 2 to 6 rows deep, containing numerous chloroplastids; cells of dorsal-pneumatic tissue (loose mesophyll) very few; fibrovascular tissues not strongly developed except in the midrib and more prominent veins; numerous 1-celled, much twisted, thick-walled, non-glandular hairs occurring on the lower surface between the veins.

Under the microscope, sections of the stems of Eriodictyon show the epidermis usually replaced by strongly lignified cork; cortex of from 10 to 20 rows of more or less rounded cells; bast-fibers deep-seated with thick, more or less strongly lignified walls and occurring in small groups forming a more or less interrupted circle; sieve tissues in a narrow zone; wood-wedges consisting of tracheæ with spiral thickenings, simple or bordered pores and numerous strongly lignified wood-fibers, separated by medullary rays 1-cell in width; pith very large, the walls of the cells being strongly lignified and with numerous simple pores.

Preparation—Fluidextractum Eriodictyi.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

EUCALYPTOL

Eucalyptol

Cineol

An organic compound [$C_{10}H_{18}O = 154.14$] obtained from the volatile oil of *Eucalyptus Globulus* Labillardière (Fam. *Myrtaceæ*) and from other sources. Preserve it in well-closed containers, in a cool place, protected from light.

Eucalyptol is a colorless liquid, having a characteristic, aromatic and distinctly camphoraceous odor, and a pungent, spicy taste; it produces a cooling sensation in the mouth.

Eucalyptol is very slightly soluble in water, miscible with alcohol, chloroform, ether, glacial acetic acid, or fixed or volatile oils.

Specific gravity: 0.921 to 0.923 at 25° C.

It boils between 174° and 177° C.

Congealing point: not below 0° C.

Eucalyptol is optically inactive (distinction from *oil of eucalyptus and many other volatile oils*).

Place 1 mil of Eucalyptol in a freezing mixture and gradually add to it an equal volume of phosphoric acid; a solid, white, crystalline mass of cineol-phosphoric acid results, and if warm water is then added the Eucalyptol separates.

Shake 5 mils of Eucalyptol with 5 mils of sodium hydroxide T.S.; the volume of the Eucalyptol is not diminished (*saponifiable oils*).

Its alcoholic solution (1 in 10) is neutral to moistened litmus paper, and, on adding a drop of ferric chloride T.S. to 5 mils of this solution, no brown or violet color is produced (*phenols*).

AVERAGE DOSE—Metric, 0.3 mil—Apothecaries, 5 minims.

EUCALYPTUS

Eucalyptus

Eucalypt.—Blue Gum Leaves

The dried leaves of *Eucalyptus Globulus* Labillardière (Fam. *Myrtaceæ*), collected from the older parts of the tree, without the presence or admixture of more than 3 per cent. of the stems, fruits or other foreign matter.

Laminæ lanceolately scythe-shaped, from 8 to 30 cm. in length and from 2 to 7.5 cm. in breadth; summits when present acute or acuminate; bases unequal, obtuse or more or less rounded and connected with a twisted petiole from 5 to 35 mm. in length; margins slightly uneven, revolute; coriaceous; both surfaces varying from pale yellowish-green to grayish-green and more or less glaucous, glabrous, glandular-punctate and with numerous small, circular, brown dots of cork; veins of the first order anastomosing with each other and forming a line nearly parallel with the margin; odor slightly aromatic; taste aromatic, bitter, and cooling.

Under the microscope, sections of Eucalyptus show the upper and lower surfaces with nearly similar cells, the outer walls being strongly cuticularized; stomata occur on both surfaces, a region of palisade cells made up of from 3 to 4 rows of cells occurring beneath each surface; among the palisade cells occur large oil-secretion reservoirs, with a yellowish or orange colored oily content; calcium oxalate crystals in cells of the loose mesophyll in the form of rosette aggregates or monoclinic prisms varying from 0.015 to 0.025 mm. in diameter. At the periphery of the fibro-vascular bundles of the midrib and petiole occurs a more or less interrupted circle of small groups of slightly lignified bast-fibers.

Preparation—Fluidextractum Eucalypti.

AVERAGE DOSE—Metric, 2 Gm.—Apothecaries, 30 grains.

EUGENOL

Eugenol

An unsaturated, aromatic phenol [$C_{10}H_{12}O_2$ or $C_6H_3.C_3H_5.OCH_3.OH$ 1 : 3 : 4 = 164.10] obtained from oil of clove and from other sources. Preserve it in well-closed containers, in a cool place, protected from light.

Eugenol is a colorless or pale yellow, thin liquid, having a strongly aromatic odor of clove, and a pungent and spicy taste. Exposure to air causes it to become darker and thicker.

Eugenol is miscible with alcohol, chloroform, ether or fixed oils; it is soluble in twice its volume of 70 per cent. alcohol.

A mixture of 1 part of Eugenol and 20 parts of hot distilled water is only very slightly acid to litmus.

Specific gravity: 1.064 to 1.070 at 25° C.

It boils between 250° and 255° C.

It is optically inactive and strongly refractive.

Dissolve 1 mil of Eugenol in 12 mils of sodium hydroxide T.S. and add 18 mils of distilled water; a clear solution results, which becomes turbid when exposed to air. Shake 1 mil of Eugenol with 20 mils of distilled water and filter; 5 mils of the clear filtrate, upon the addition of 1 drop of ferric chloride T.S., shows a transient, grayish-green color, but not a blue or violet color (*phenol*).

Average dose—Metric, 0.2 mil—Apothecaries, 3 minims.

EXTRACTA

Extracts

Pilular Extracts are solid or semi-solid products prepared by exhausting drugs with appropriate solvents and carefully evaporating the solutions to the proper consistence. These extracts preserve the useful constituents of the drug in a concentrated, relatively uniform and permanent condition, and in a form suitable for medication.

The solvents or menstrua employed in the preparation of pilular extracts are water, alcohol, or mixtures of these in the proportions stated in the formulas. A few drugs require for their extraction the addition of an acid or an alkali to the solvent. Where alcohol is used in the extraction it may be recovered by distillation.

In the preparation of pilular extracts the concentration of the solutions should be completed without delay, and undue exposure to heat must be avoided. The limit of temperature for the evaporation, as stated in the formulas, should not be exceeded. In the manufacture of these extracts on a large scale an apparatus for distilling and evaporating under reduced pressure should be used. It is also important that the residue be frequently stirred so as to hasten the evaporation and to obtain a uniform product.

Pilular extracts are extensively used in pill masses and in ointments and, to facilitate their use in these preparations, the degree of concentration is commonly directed to be that of a "pilular consistence."

Pilular extracts should be protected from exposure to sunlight and air by being kept in tightly-covered glass or earthen-ware containers.

Powdered Extracts differ from pilular extracts in that they are dry, fine powders. Powdered extracts are often preferred to pilular extracts for general use, because they can be more accurately weighed, more easily dispensed, and more conveniently preserved in tightly-stoppered bottles.

In the preparation of powdered extracts, it is necessary to use solvents that will extract the active principles of the drugs, and only a minimum amount of the inert substances. Where the drug contains an oily constituent that would be extracted by the menstruum directed, it becomes necessary to adopt in the process of manufacture a method for the separation of this oil so that the product will retain a satisfactory, pulverulent form.

The concentration of the liquids containing the extractive should be completed without delay and undue exposure to heat must be avoided.

The limit of temperature as stated in the formulas should not be exceeded, and the use of apparatus for concentrating under reduced pressure is recommended. The final drying of the soft extract can be greatly facilitated by spreading it upon plates of glass or tinned metal and exposing it to currents of warm, dry air. Powdered extracts must be thoroughly dried, powdered and mixed with the diluent and preserved in tightly-stoppered, small, wide-mouthed, amber-colored bottles, and stored in a cool and dry place.

Alkaloidal standards have been adopted for Extracts that can be reliably assayed. Assay methods are directed for the determination of their strength, and to provide for standardization. When necessary, an inert diluent is directed to reduce the product to the standard. In the official formulas glucose is directed for the diluent in pilular extracts and dried starch and magnesium oxide are directed for powdered extracts, but it is permissible for the manufacturer to use as inert diluents for the latter, sugar, sugar of milk, powdered glycyrrhiza, magnesium carbonate or the finely powdered drug or marc from which the respective extract was made. For the convenience of the prescriber, the standards of strength for the Extracts have been adjusted, wherever possible, so that each bears a definite relation to that of the respective drug of average strength, and a statement of the standard precedes the formula.

EXTRACTUM ACONITI

Extract of Aconite

Ext. Aconit.—Powdered Extract of Aconite

Extract of Aconite yields not less than 1.8 per cent. nor more than 2.2 per cent. of the ether-soluble alkaloids of aconite and, if assayed biologically, the minimum lethal dose should not be greater than 0.00001 Gm. for each gramme of body weight of guinea-pig. *One gramme* of the Extract represents about *four grammes* of aconite.

Aconite, in No. 60 powder, *one thousand grammes*	1000 Gm.
Tartaric Acid, *five grammes*	5 Gm.
Purified Petroleum Benzin,	
Starch, dried at 100° C.,	
Alcohol, each, *a sufficient quantity.*	

Dissolve the tartaric acid in *five hundred mils* of alcohol, moisten the drug with this solution and pack it in a cylindrical glass percolator; then add sufficient alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed very slowly, adding alcohol as required. Reserve the first *one thousand mils* of percolate and continue the percolation, until the second percolate measures *one thousand mils* or until the drug is exhausted. Transfer this second percolate to a suitable apparatus and distil off the alcohol at as low a temperature as practicable, until a residue measuring about *one hundred mils* remains, then add the reserved percolate and continue distillation until the residue in the still is of syrupy consistence.

Transfer this syrupy residue to a flask, using a little warm alcohol to rinse the still, and adding the rinsing to the flask. When it has cooled, add *two hundred and fifty mils* of purified petroleum benzin and shake the mixture thoroughly for several minutes. Allow the liquids to separate and decant the benzin layer as closely as possible; add again to the residue *two hundred and fifty mils* of purified petroleum benzin, agitate and decant the benzin layer as before.

Transfer the syrupy residue to a shallow evaporating dish, rinse the flask with *twenty mils* of warm alcohol, adding the rinsings to the residue in the dish, and then incorporate *fifty grammes* of the thoroughly dried starch. Evaporate the mixture by a very gentle heat on a water bath, frequently stirring, and, when the mass has become thick, spread it on glass plates and continue the drying in an air bath at a temperature not exceeding 70° C. until thoroughly dry. Reduce the product to a fine powder and weigh it.

Assay a portion of this product as directed below, and, from the alkaloidal content thus determined, ascertain by calculation the amount of alkaloids in the remainder of the powder and add to this enough of the dried starch to make the finished Extract contain 2 per cent. of the ether-soluble alkaloids of aconite. Mix the powders thoroughly, pass the Extract through a fine sieve, transfer it to small, wide-mouthed bottles and stopper them tightly.

Assay—Introduce 3 Gm. of Extract of Aconite into a 250 mil flask, add 10 Gm. of washed sand and mix thoroughly. Then add 150 mils of ether and 2 mils of ammonia water, shake the mixture vigorously every few minutes during a half hour, and when the dregs have settled decant 100 mils of the clear liquid, representing *two grammes* of the Extract. Proceed as directed under *Belladonnæ Radix*, page 73, twelfth line of the Assay, modifying the process there given by using ether instead of chloroform for the final shaking out of the alkaloids.

Each mil of tenth-normal sulphuric acid V.S. consumed corresponds to 64.539 milligrammes of the ether-soluble alkaloids of aconite.

For an alternative method of assaying Extract of Aconite see Biological Assays (Part II).

AVERAGE DOSE—Metric, 0.01 Gm.—Apothecaries, $\frac{1}{6}$ grain.

EXTRACTUM BELLADONNÆ FOLIORUM

Extract of Belladonna Leaves

Ext. Bellad. Fol.

Extract of Belladonna Leaves yields not less than 1.18 per cent. nor more than 1.32 per cent. of the alkaloids of belladonna leaves. *One gramme* of the Extract represents about *four grammes* of belladonna leaves.

Pilular Extract of Belladonna Leaves

BELLADONNA LEAVES, in No. 40 powder, *one thousand grammes*	1000 Gm.
GLUCOSE,	
ALCOHOL,	
WATER, each, *a sufficient quantity.*	

Moisten the powder with sufficient of a mixture of *three volumes* of alcohol and *one volume* of water and pack it firmly in a cylindrical percolator, then add enough menstruum, using the same proportion of alcohol and water as before, to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed, gradually adding menstruum of the same strength, until the percolate measures *three thousand mils*, or until the belladonna leaves are exhausted. Recover the alcohol from the percolate by distillation and evaporate the residue with frequent stirring, at a temperature not exceeding 70° C., to a pilular consistence. Mix the mass thoroughly and weigh it.

Assay a portion of this extract, as directed below, and, from the alkaloidal content thus determined, ascertain by calculation the amount of alkaloids in the remainder of the mass, and to this add enough glucose to make the finished Extract contain 1.25 per cent. of the alkaloids of belladonna leaves. Mix thoroughly.

Assay—Dissolve 2 Gm. of Pilular Extract of Belladonna Leaves in 10 mils of diluted alcohol, transfer the solution to a separator and wash the vessel in which the extract was dissolved with 2 mils of ammonia water previously diluted with 10 mils of distilled water, in divided portions, adding the rinsings to the separator, then proceed as directed under *Fluidextractum Belladonnæ Radicis*, page 178, second line of the Assay, beginning with the word "Completely," modifying the process there given by treating the residue twice with 5 mils of ether and evaporating to dryness each time before titration.

Each mil of tenth-normal sulphuric acid V.S. consumed corresponds to 28.92 milligrammes of the alkaloids of belladonna leaves.

Powdered Extract of Belladonna Leaves

Belladonna Leaves in No. 40 powder, *one thousand grammes*	1000 Gm.
Magnesium Oxide, *twenty grammes*	20 Gm.
Starch, dried at 100° C.,	
Alcohol, each, *a sufficient quantity*.	

Moisten the drug with sufficient alcohol and pack it in a cylindrical percolator; then add enough alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed very slowly, adding alcohol as required. Reserve the first *one thousand mils* of percolate and continue the percolation until the second percolate measures *one thousand mils* or until the drug is exhausted. Transfer the second percolate to a suitable apparatus and distil off the alcohol at as low a temperature as practicable, until a residue measuring about *one hundred mils* remains, then add the reserved percolate and continue distillation until the residue in the still is of syrupy consistence.

Transfer this syrupy residue to a shallow evaporating dish, rinse the flask or still with a small quantity of warm alcohol, adding the rinsing to the residue in the dish. Evaporate this extract to a pilular consistence, at a temperature not exceeding 70° C., then add *fifty grammes* of the dried starch and continue the heating, with frequent stirring, until the mass is nearly dry. Now add the magnesium oxide, thoroughly incorporate it and set the product aside in a current of warm air, until thoroughly dry. Reduce the product to a fine powder and weigh it.

Assay a portion of this product as directed below, and, from the alkaloidal content thus determined, ascertain by calculation the amount of alkaloids in the remainder of the powder and add to this enough of the dried starch to make the finished Extract contain 1.25 per cent. of the alkaloids of belladonna leaves. Mix the powders thoroughly, pass the Extract through a fine sieve, transfer it to small, wide-mouthed bottles and stopper them tightly.

Assay—Introduce 3 Gm. of Powdered Extract of Belladonna Leaves into a 250 mil flask, add 10 Gm. of washed sand and mix thoroughly. Then add 150 mils of a mixture of chloroform, 1 volume, and ether, 2 volumes, followed by 5 mils of ammonia water. Shake the mixture vigorously every ten minutes during a half hour and when the dregs have settled decant 100 mils of the clear liquid, representing *two grammes* of the Extract; now proceed as directed under *Belladonnæ Radix*, page 73, seventh line of the Assay, modifying the process there given by treating the residue twice with ether, and evaporating to dryness each time before titration.

Each mil of tenth-normal sulphuric acid V.S. consumed corresponds to 28.92 milligrammes of the alkaloids of belladonna leaves.

Preparation—Unguentum Belladonnæ (from Pilular Extract).

AVERAGE DOSE—Metric, 0.015 Gm.—Apothecaries, ¼ grain.

EXTRACTUM CANNABIS

Extract of Cannabis

Ext. Cannab.—Extractum Cannabis Indicæ, U.S.P. VIII

Extract of Cannabis, when assayed biologically, produces incoördination when administered to dogs in a dose of not more than 0.004 Gm. of Extract per kilogramme of body weight.

CANNABIS, in No. 20 powder, *one thousand grammes*	1000 Gm.
ALCOHOL, *a sufficient quantity.*	

Moisten the powder with sufficient alcohol, pack it firmly in a cylindrical percolator and add enough alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed, gradually adding alcohol, until the drug is exhausted. Recover the alcohol from the percolate by distillation and evaporate the residue with frequent stirring, at a temperature not exceeding 70° C., to a pilular consistence. Mix the mass thoroughly and weigh it.

Assay a portion of this extract, and from the result thus obtained adjust the weight of the finished Extract, by the addition of glucose, to conform to the required biological standard.

Assay—Proceed as directed under Biological Assays (Part II).

AVERAGE DOSE—Metric, 0.01 Gm.—Apothecaries, $\frac{1}{6}$ grain.

EXTRACTUM CASCARÆ SAGRADÆ

Extract of Cascara Sagrada

Ext. Casc. Sagr.—Extractum Rhamni Purshianæ, U.S.P. VIII
Powdered Extract of Cascara Sagrada

One gramme of the Extract represents *three grammes* of cascara sagrada.

CASCARA SAGRADA, in No. 20 powder, *nine hundred grammes*	900 Gm.
MAGNESIUM OXIDE, *twenty-five grammes*..................	25 Gm.
STARCH, dried at 100° C.,	
BOILING WATER, each, *a sufficient quantity*,	
To make *three hundred grammes*	300 Gm.

Mix the cascara sagrada with *four thousand mils* of boiling water and macerate the mixture during three hours. Then transfer it to a metallic percolator, allow it to drain and pour on boiling water until the percolate measures *five thousand mils* or the drug is exhausted. Evaporate the percolate to dryness on a water bath or steam bath, reduce the extract to a fine powder, weigh it, add the magnesium oxide and enough of the dried starch to make the product weigh *three hundred grammes*. Mix the powders thoroughly, pass the Extract through a fine sieve, transfer it to small, wide-mouthed bottles and stopper them tightly.

AVERAGE DOSE—Metric, 0.25 Gm.—Apothecaries, 4 grains.

EXTRACTUM CIMICIFUGÆ

Extract of Cimicifuga

Ext. Cimicif.—Powdered Extract of Cimicifuga

One gramme of the Extract represents *four grammes* of cimicifuga.

CIMICIFUGA, in No. 40 powder, *one thousand grammes*.....	1000 Gm.
ALCOHOL,	
STARCH, dried at 100° C., each, *a sufficient quantity*,	
To make *two hundred and fifty grammes*.....	250 Gm.

Moisten the drug with sufficient alcohol, pack it in a cylindrical percolator, and add enough alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed slowly, adding alcohol as required until the drug is exhausted. Recover the alcohol from the percolate by distillation and evaporate the residue to dryness, with frequent stirring, at a temperature not exceeding 70° C. Weigh the residue and add sufficient of the dried starch to make the product weigh *two hundred and fifty grammes.* Reduce the mixture to a fine powder, mix thoroughly, pass the Extract through a fine sieve, transfer it to small, wide-mouthed bottles and stopper them tightly.

AVERAGE DOSE—Metric, 0.25 Gm.—Apothecaries, 4 grains.

EXTRACTUM COLCHICI CORMI

Extract of Colchicum Corm

Ext. Colch. Corm.—Powdered Extract of Colchicum Corm

Extract of Colchicum Corm yields not less than 1.25 per cent. nor more than 1.55 per cent. of colchicine. *One gramme* of the Extract represents about *four grammes* of colchicum corm.

COLCHICUM CORM, in No. 60 powder, *one thousand grammes*	1000 Gm.
ALCOHOL,	
PURIFIED PETROLEUM BENZIN,	
STARCH, dried at 100° C., each, *a sufficient quantity.*	

Moisten the drug with sufficient alcohol, pack it in a cylindrical percolator and add enough alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed slowly, adding alcohol as required, until the percolate measures *two thousand mils* or until the drug is exhausted. Recover the alcohol from the percolate by distillation at as low a temperature as practicable until a residue measuring about *one hundred and fifty mils* remains in the still. Transfer this residue to a flask, using a little warm alcohol to rinse the still, and add the rinsings to the flask. When it has cooled, add *two hundred and fifty mils* of purified petroleum benzin and shake the mixture thoroughly for several minutes. Allow the liquids to separate and decant the benzin layer as closely as possible; again add to the residue *one hundred and fifty mils* of purified petroleum benzin, agitate and decant the benzin layer as before, repeat the washing with *one hundred mils* of purified petroleum benzin and reject the benzin washings.

Transfer the residue to a shallow evaporating dish, rinse the flask with a little warm alcohol, adding the rinsings to the residue in the dish, and evaporate it on a water bath to a thick extract. To this add *fifty grammes* of the dried starch, mix well, spread the mixture on glass plates and continue the drying in an air bath at a temperature not exceeding 70° C. until thoroughly dry. Reduce the product to a fine powder and weigh it.

Assay a portion of this product as directed below, and, from the alkaloidal content thus determined, ascertain by calculation the amount of alkaloid in the remainder of the powder and add to this enough of the dried starch to make the finished Extract contain 1.4 per cent. of colchicine. Mix the powders thoroughly, pass the Extract through a fine sieve, transfer it to small wide-mouthed bottles and stopper them tightly.

Assay—Proceed as directed under *Colchici Semen*, page 120, modifying the process there given by using 6 Gm. of the Extract of Colchicum Corm instead of 15 Gm. of colchicum seed. The final weight will be the amount of colchicine from *two grammes* of Extract of Colchicum Corm.

AVERAGE DOSE—Metric, 0.06 Gm.—Apothecaries, 1 grain.

EXTRACTUM COLOCYNTHIDIS

Extract of Colocynth

Ext. Colocynth.—Powdered Extract of Colocynth

One gramme of the Extract represents *four grammes* of colocynth.

COLOCYNTH, in No. 20 powder, *one thousand grammes*	1000 Gm.
DILUTED ALCOHOL,	
STARCH, dried at 100° C., each, *a sufficient quantity,*	
To make *two hundred and fifty grammes*.....	250 Gm.

Moisten the drug with *two thousand mils* of diluted alcohol and macerate it in a closed vessel for twenty-four hours, then transfer the moist drug to a cylindrical percolator, shake it down evenly without packing, and gradually pour diluted alcohol upon it, allowing the percolation to proceed slowly, until the percolate measures *five thousand mils.* Recover the alcohol from the percolate by distillation and evaporate the residue to dryness on a water bath or steam bath. Reduce the extract to a fine powder, weigh it, and add sufficient of the dried starch to make the product weigh *two hundred and fifty grammes.* Mix the powders thoroughly, pass the Extract through a fine sieve, transfer it to small, wide-mouthed bottles and stopper them tightly.

Preparation—Extractum Colocynthidis Compositum.

AVERAGE DOSE—Metric, 0.03 Gm.—Apothecaries, ½ grain.

EXTRACTUM COLOCYNTHIDIS COMPOSITUM

Compound Extract of Colocynth

Ext. Colocynth. Co.—Powdered Compound Extract of Colocynth

EXTRACT OF COLOCYNTH, *one hundred and sixty grammes*	160 Gm.
ALOES, *five hundred grammes*	500 Gm.
CARDAMOM SEED, in No. 60 powder, *fifty grammes*	50 Gm.
RESIN OF SCAMMONY, in No. 60 powder, *one hundred and forty grammes*	140 Gm.
SOAP, dried and in powder, *one hundred and fifty grammes*	150 Gm.
To make *one thousand grammes*	1000 Gm.

Triturate the ingredients until the product is reduced to a No. 60 powder. Pass the Extract through a fine sieve, transfer it to small, wide-mouthed bottles and stopper them tightly.

Preparation—Pilulæ Catharticæ Compositæ.

AVERAGE DOSE—Metric, 0.25 Gm.—Apothecaries, 4 grains.

EXTRACTUM ERGOTÆ

Extract of Ergot

Ext. Ergot.

ERGOT, in No. 40 powder, *one thousand grammes*	1000 Gm.
HYDROCHLORIC ACID, *ten milliliters*	10 mils
PURIFIED PETROLEUM BENZIN,	
ALCOHOL,	
WATER, each, *a sufficient quantity.*	

Pack the ergot in a percolator and slowly percolate it with purified petroleum benzin until a few drops of the percolate, evaporated on filter paper, leave no greasy stain. Reject the benzin percolate, remove the ergot from the percolator and dry it by exposure to the air. Mix *eight hundred and fifty mils* of alcohol with *one hundred and fifty mils* of water, add the hydrochloric acid to *four hundred mils* of this mixture, and moisten the ergot with the acid mixture. Pack it in a cylindrical percolator and macerate for six hours, then add enough of the menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed, gradually adding menstruum, using the same proportion of alcohol and water as before, until the drug is exhausted. Recover the alcohol from the percolate by distillation and evaporate the residue with frequent stirring, at a temperature not exceeding 70° C., to a pilular consistence.

Average dose—Metric, 0.25 Gm.—Apothecaries, 4 grains.

EXTRACTUM FELLIS BOVIS

Extract of Oxgall

Ext. Fel. Bov.—Powdered Extract of Oxgall

One gramme of the Extract represents *eight grammes* of oxgall.

Oxgall, *eight hundred grammes*	800 Gm.
Alcohol, *fifteen hundred milliliters*	1500 mils
Starch, dried at 100° C., *a sufficient quantity,*	
To make *one hundred grammes*	100 Gm.

Add *one thousand mils* of alcohol slowly and with agitation to the oxgall contained in a bottle of sufficient size. Allow the mixture to stand for two days and then decant the liquid portion. Wash the residue in the bottle with an additional *five hundred mils* of alcohol, decant the liquid portion, mix it with the liquid first separated and filter the mixture. Recover the alcohol from the filtrate by distillation, transfer the residue to a shallow dish and evaporate it to a thick extract at a temperature between 75° and 80° C. Spread this extract on glass plates and continue the drying by exposure to warm air, at a temperature not exceeding 70° C., until thoroughly dry. Reduce the extract to a fine powder, weigh it and add sufficient of the dried starch to make the product weigh *one hundred grammes.* Mix the powders thoroughly, pass the Extract through a fine sieve, transfer it to small, wide-mouthed bottles and stopper them tightly.

Average dose—Metric, 0.1 Gm.—Apothecaries 1½ grains.

EXTRACTUM GELSEMII

Extract of Gelsemium

Ext. Gelsem.—Powdered Extract of Gelsemium

One gramme of the Extract represents *four grammes* of gelsemium.

Gelsemium, in No. 40 powder, *one thousand grammes*	1000 Gm.
Alcohol,	
Magnesium Oxide,	
Starch, dried at 100° C., each, *a sufficient quantity,*	
To make *two hundred and fifty grammes*	250 Gm.

Moisten the drug with sufficient alcohol, pack it in a cylindrical percolator and add enough alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed slowly, adding alcohol as required, until the drug is exhausted. Recover the alcohol from the percolate, by distillation at as low a temperature as practicable, until a residue measuring about *five hundred mils* remains in the still. Transfer this residue to a shallow dish, and evaporate it to a soft extract with frequent stirring, at a temperature not exceeding 70° C. Then add *fifty grammes* of a mixture of *one part* of magnesium oxide and *three parts* of the dried starch, mix well, spread the mass in a thin layer on glass or tinned-metal plates or in a porcelain dish and continue the drying in an air bath, at a temperature not exceeding 70° C., until thoroughly dry. Reduce the extract to a fine powder, weigh it, and add sufficient of the mixture of magnesium oxide and dried starch, made in the same proportion as before, to make the finished product weigh *two hundred and fifty grammes.* Mix the powders thoroughly, pass the Extract through a fine sieve, transfer it to small, wide-mouthed bottles and stopper them tightly.

Average dose—Metric, 0.01 Gm.—Apothecaries, ⅙ grain.

EXTRACTUM GENTIANÆ

Extract of Gentian

Ext. Gentian.

Gentian, in No. 20 powder, *one thousand grammes*........	1000 Gm.
Water, *a sufficient quantity.*	

Moisten the powder with sufficient water, and allow it to macerate for twenty-four hours; then pack it in a conical percolator, and gradually pour water upon it until the drug is exhausted. Reduce the liquid to *two thousand mils* by boiling, strain it, and then evaporate it to a pilular consistence on a water bath.

Average dose—Metric, 0.25 Gm.—Apothecaries, 4 grains.

EXTRACTUM GLYCYRRHIZÆ

Extract of Glycyrrhiza

Ext. Glycyrrh.—Extract of Licorice

The commercial Extract of Glycyrrhiza.

In flattened, cylindrical rolls or in masses, of a glossy black color externally; fracture brittle, sharp, smooth, conchoidal; taste characteristic and sweet. When pulverized it yields a brown powder. Not less than 60 per cent. of Extract of Glycyrrhiza is soluble in cold water. The yield of ash does not exceed 6 per cent.

Preparations—Trochisci Ammonii Chloridi Trochisci Cubebæ.

EXTRACTUM GLYCYRRHIZÆ PURUM

Pure Extract of Glycyrrhiza

Ext. Glycyrrh. Pur.

Glycyrrhiza, in No. 20 powder, *one thousand grammes*...	1000 Gm.
Ammonia Water, *one hundred and fifty milliliters*........	150 mils
Water,	
Chloroform Water, each, *a sufficient quantity.*	

Mix the ammonia water with *three thousand mils* of water, and, having moistened the powder with *one thousand mils* of the mixture, allow it to macerate in a closed vessel for twenty-four hours. Then pack it lightly in a cylindrical percolator, and gradually pour upon it, first the remainder of the menstruum, and then chloroform water, until the glycyrrhiza is exhausted. Evaporate the liquid in a tared, porcelain dish on a water bath, to a pilular consistence.

Preparation—Mistura Glycyrrhizæ Composita.

EXTRACTUM HYDRASTIS

Extract of Hydrastis

Ext. Hydrast.—Extract of Golden Seal Powdered Extract of Hydrastis

Extract of Hydrastis yields not less than 9 per cent. nor more than 11 per cent. of the ether-soluble alkaloids of hydrastis. *One gramme* of the Extract represents about *four grammes* of hydrastis.

Hydrastis, in No. 40 powder, *one thousand grammes*	1000 Gm.
Tartaric Acid, *five grammes*	5 Gm.
Alcohol,	
Magnesium Oxide,	
Starch, dried at 100° C., each, *a sufficient quantity.*	

Dissolve the tartaric acid in *one thousand mils* of alcohol, moisten the drug with sufficient of this solution and pack in a cylindrical percolator; then add enough of the acidified alcohol, followed by alcohol if necessary, to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed slowly, adding alcohol as required, until the drug is exhausted. Recover the alcohol from the percolate by distillation, and evaporate the residue to a soft extract, with frequent stirring, at a temperature not exceeding 70° C. Add *fifty grammes* of a mixture of *one part* of magnesium oxide and *three parts* of the dried starch, mix thoroughly and spread the mass in a thin layer on glass or tinned-metal plates or in a porcelain dish and continue the drying in an air bath at a temperature not exceeding 70° C., until thoroughly dry. Then reduce the extract to a fine powder and weigh it.

Assay a portion of this product as directed below, and, from the alkaloidal content thus determined, ascertain by calculation the amount of alkaloids in the remainder of the powder and add to this enough of the mixture of magnesium oxide and dried starch, made in the same proportion as before, to make the finished Extract contain 10 per cent. of the ether-soluble alkaloids of hydrastis. Mix the powders thoroughly, pass the Extract through a fine sieve, transfer it to small, wide-mouthed bottles and stopper them tightly.

Assay—Introduce 3 Gm. of Extract of Hydrastis into a 250 mil flask, add 10 Gm. of washed sand and mix thoroughly. Then add 150 mils of ether and 5 mils of ammonia water. Shake the mixture vigorously every ten minutes during a half hour, and when the dregs have settled decant 100 mils of the clear liquid, representing *two grammes* of the Extract. Proceed as directed under *Belladonnæ Radix,* page 73, seventh line of the Assay, modifying the process there given by using ether instead of chloroform for the final shaking out of the alkaloids, and drying the residue to constant weight at 100° C., instead of titrating it. The weight will be the amount of ether-soluble alkaloids from *two grammes* of Extract of Hydrastis.

Average dose—Metric, 0.5 Gm.—Apothecaries, 8 grains.

EXTRACTUM HYOSCYAMI

Extract of Hyoscyamus

Ext. Hyosc.

Extract of Hyoscyamus yields not less than 0.22 per cent. nor more than 0.28 per cent. of the alkaloids of hyoscyamus. *One gramme* of the Extract represents about *four grammes* of hyoscyamus.

Hyoscyamus, in No. 40 powder, *one thousand grammes* . . .	1000 Gm.
Glucose,	
Alcohol,	
Water, each, *a sufficient quantity.*	

Moisten the powder with sufficient of a mixture of *three volumes* of alcohol and *one volume* of water, pack it firmly in a cylindrical percolator and add enough menstruum, using the same proportion of alcohol and water as before, to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed slowly, gradually adding menstruum of the same strength until the drug is exhausted. Recover the alcohol by distillation and evaporate the residue, with frequent stirring, at a temperature not exceeding 70° C., until it is reduced to a pilular consistence. Mix the mass thoroughly and weigh it.

Assay a portion of this extract as directed below, and, from the alkaloidal content thus determined, ascertain by calculation the amount of alkaloids in the remainder of the mass and to this add enough glucose to make the finished Extract contain 0.25 per cent. of the alkaloids of hyoscyamus. Mix thoroughly.

Assay—Proceed as directed under *Extractum Belladonnæ Foliorum* (Pilular), page 145, modifying the process there given by using 5 Gm. of Extract of Hyoscyamus instead of 2 Gm. of extract of belladonna leaves.

Each mil of tenth-normal sulphuric acid V.S. consumed corresponds to 28.92 milligrammes of the alkaloids of hyoscyamus.

Average dose—Metric, 0.06 Gm.—Apothecaries, 1 grain.

EXTRACTUM MALTI

Extract of Malt

Ext. Malt.

MALT, in coarse powder (not finer than No. 12), *one thousand grammes*.. 1000 Gm.
WATER, *a sufficient quantity.*

Pour *one thousand mils* of water upon the powder contained in a suitable vessel and macerate for six hours, then add *four thousand mils* of water, heated to 60° C., and digest the mixture for one hour on a water bath at a temperature not exceeding 60° C. Strain the mixture, express, filter the strained liquid, and, by means of a water bath or vacuum apparatus, evaporate the liquid, at a temperature not exceeding 60° C., until it has a specific gravity of not less than 1.350 nor more than 1.400 at 25° C.

AVERAGE DOSE—Metric, 15 Gm.—Apothecaries, 4 drachms.

EXTRACTUM NUCIS VOMICÆ

Extract of Nux Vomica

Ext. Nuc. Vom.—Powdered Extract of Nux Vomica Nucis vomicæ extractum P. I.

Extract of Nux Vomica yields not less than 15.2 per cent. nor more than 16.8 per cent. of the alkaloids of nux vomica.

NUX VOMICA, in No. 20 powder, *one thousand grammes*... 1000 Gm.
ALCOHOL,
WATER,
PURIFIED PETROLEUM BENZIN,
DILUTED SULPHURIC ACID,
AMMONIA WATER,
CHLOROFORM,
MAGNESIUM OXIDE,
STARCH, dried at 100° C., each, *a sufficient quantity.*

Moisten the drug with sufficient of a mixture of *three volumes* of alcohol and *one volume* of water, pack it firmly in a cylindrical percolator, and add enough of the menstruum, using the same proportion of alcohol and water as before, to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed slowly, gradually adding the menstruum as required, until the percolate passes but faintly imbued with bitterness, and the drug is exhausted. Recover the alcohol from the percolate by distillation at as low a temperature as practicable and concentrate the liquid until the residue measures about *two hundred mils*. Transfer this residue to a flask or separator, using a little warm menstruum made of the same proportion of alcohol and water originally used, to rinse the still, and add the rinsing to the separator. Then add *one hundred and fifty mils* of water and *two hundred mils* of purified petroleum benzin and shake the mixture thoroughly for several minutes. Allow the liquids to separate and decant the benzin layer as closely as possible; again add to the residue *one hundred mils* of purified petroleum benzin, agitate, and decant the benzin as before.

Wash the mixed benzin solutions, in a separator, with a mixture of *one hundred mils* of water and *ten mils* of diluted sulphuric acid, separate the aqueous layer and repeat the washing twice with fresh portions, *one hundred mils* each, of water and acid made in the same proportion as before. Collect the aqueous solutions in a separator, render the liquid alkaline by the addition of ammonia water and shake it out with three portions of chloroform, *twenty mils*, *ten mils*, and *ten mils*, respectively. Add the combined chloroform solutions to the extract and evaporate the mixture to dryness on a water bath with frequent stirring.

Assay a portion of this product as directed below, and, from the alkaloidal content thus determined, ascertain by calculation the amount of alkaloids in the remainder of the product and add to this enough of a mixture of magnesium oxide, *one part*, and of the dried starch, *three parts*, to make the finished Extract contain 16 per cent. of the alkaloids of nux vomica. Reduce the mixture to a fine powder, mix thoroughly, pass the Extract through a fine sieve, transfer it to small, wide-mouthed bottles and stopper them tightly.

Assay—Introduce 3 Gm. of Extract of Nux Vomica into a 250 mil flask, add 10 Gm. of washed sand and mix thoroughly. Then add 150 mils of a mixture of ether, 2 *volumes*, and chloroform, 1 *volume*, followed by 5 mils of ammonia water. Shake the mixture vigorously every ten minutes during half an hour, and when the dregs have settled decant 100 mils of the clear liquid, representing *two grammes* of the Extract. Proceed as directed under *Belladonnæ Radix*, page 73, seventh line of the Assay, modifying the process there given by dissolving the alkaloidal residue in 10 mils of tenth-normal sulphuric acid V.S. instead of 5 mils.

Each mil of tenth-normal sulphuric acid V.S. consumed corresponds to 36.4 milligrammes of the alkaloids of nux vomica.

AVERAGE DOSE—Metric, 0.015 Gm.—Apothecaries, 1/4 grain.

EXTRACTUM OPII

Extract of Opium

Ext. Opii—Powdered Extract of Opium Opii extractum P. I.

Extract of Opium yields not less than 19.5 per cent. nor more than 20.5 per cent. of anhydrous morphine. *One gramme* of the Extract represents about *two grammes* of opium.

Opium, cut in small pieces, *one hundred grammes*.	100 Gm.
Starch, dried at 100° C.,	
Water, each, *a sufficient quantity.*	

Macerate the opium with *three hundred mils* of hot water until softened, then rub to a smooth paste. Add to this *one hundred grammes* of clean, white sand and mix thoroughly. Transfer the mixture to a percolator and allow the percolation to proceed, gradually adding water until the opium is exhausted. Evaporate the percolate to dryness in a shallow evaporating dish, on a water bath, reduce the product to a fine powder and weigh it.

Assay a portion of this product as directed below, and, from the alkaloidal content thus determined, ascertain by calculation the amount of anhydrous morphine in the remainder of the powder and add to this enough of the dried starch to make the finished Extract contain 20 per cent. of anhydrous morphine. Mix the powders thoroughly, pass the Extract through a fine sieve, transfer it to small, wide-mouthed bottles and stopper them tightly.

Assay—Dissolve 4 Gm. of Extract of Opium in 5 mils of distilled water, add gradually, with constant stirring, 25 mils of distilled water, filter, and wash the filter and residue with sufficient distilled water to make the solution measure exactly 50 mils. Then proceed as directed under *Opium*, page 306, sixteenth line of the Assay.

The morphine obtained represents *two grammes* of Extract of Opium.

Average dose—Metric, 0.03 Gm.—Apothecaries, ½ grain.

EXTRACTUM PHYSOSTIGMATIS

Extract of Physostigma

Ext. Physostig.—Powdered Extract of Physostigma

Extract of Physostigma yields not less than 1.7 per cent. nor more than 2.3 per cent. of the alkaloids of physostigma. *One gramme* of the Extract represents about *thirteen grammes* of physostigma.

Physostigma, in No. 60 powder, *one thousand grammes*	1000 Gm.
Tartaric Acid, *five grammes*	5 Gm.
Purified Petroleum Benzin,	
Starch, dried at 100° C.,	
Alcohol,	
Water, each, *a sufficient quantity.*	

Dissolve the tartaric acid in *one thousand mils* of a mixture of *three volumes* of alcohol and *one volume* of water, moisten the drug with sufficient of this solution, and pack it in a cylindrical percolator; then add enough of the acidified alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed slowly, gradually adding the remainder of the prepared menstruum and then a mixture of *three volumes* of alcohol and *one volume* of water until the drug is exhausted. Recover the alcohol from the percolate by distillation at as low a temperature as practicable and concentrate the remaining liquid at a temperature not exceeding 70° C. until the residue measures about *two hundred mils.* Transfer the residue to a flask, using a little warm menstruum, made of the same proportion of alcohol and water as before, to rinse the still, and add the rinsing to the residue in the flask. Then add *one hundred mils* of water and *two hundred and fifty mils* of purified petroleum benzin and shake the mixture thoroughly for several minutes. Allow the liquids to separate and decant the benzin layer as closely as possible; again add to the residue *two hundred mils* of purified petroleum benzin, agitate, and, after allowing the liquids to separate, decant the benzin layer as before and reject the benzin solutions.

Transfer the residue to a shallow evaporating dish, rinse the separator with a little of the warm menstruum, add the rinsings to the residue in the dish and evaporate it to pilular consistence at a temperature not exceeding 70° C. Now add *twenty grammes* of the dried starch, thoroughly incorporate it, set the extract aside in a current of warm air until dry, then reduce the product to a fine powder and weigh it.

Assay a portion of this product as directed below, and, from the alkaloidal content thus determined, ascertain by calculation the amount of alkaloids in the remainder of the powder and add to this enough of the dried starch to make the finished Extract contain 2 per cent. of the alkaloids of physostigma. Mix the powders thoroughly, pass the

Extract through a fine sieve, transfer it to small, wide-mouthed bottles and stopper them tightly.

Assay—Introduce 3 Gm. of Extract of Physostigma into a 250 mil flask, add 10 Gm. of washed sand and mix thoroughly. Then add 150 mils of ether and proceed as directed under *Physostigma*, page 320, second line of the Assay.

Each mil of tenth-normal sulphuric acid V.S. consumed corresponds to 27.52 milligrammes of the alkaloids of physostigma.

Average dose—Metric, 0.008 Gm.—Apothecaries, 1/8 grain.

EXTRACTUM RHEI

Extract of Rhubarb

Ext. Rhei—Powdered Extract of Rhubarb

One gramme of the Extract represents *two grammes* of rhubarb.

Rhubarb, in No. 40 powder, *one thousand grammes*	1000 Gm.
Magnesium Oxide, *fifty grammes*	50 Gm.
Starch, dried at 100° C.,	
Alcohol,	
Water, each, *a sufficient quantity*,	
To make, *five hundred grammes*	500 Gm.

Moisten the drug with sufficient of a mixture of *four volumes* of alcohol and *one volume* of water, pack it in a cylindrical percolator and add enough of this menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed slowly, gradually adding menstruum of the same proportion of alcohol and water as before until the drug is exhausted. Recover the alcohol from the percolate by distillation at as low a temperature as practicable, and continue distillation until a residue of syrupy consistence remains in the still. Transfer this to a shallow dish, rinse the still with a little warm menstruum, add the rinsings to the residue in the dish, and evaporate the mixture to dryness, with frequent stirring, at a temperature not exceeding 70° C. Weigh the dry extract and add the magnesium oxide and sufficient of the dried starch to make the product weigh *five hundred grammes*. Reduce the mixture to a fine powder, mix thoroughly, pass the Extract through a fine sieve, transfer it to small, wide-mouthed bottles and stopper them tightly.

Average dose—Metric, 0.25 Gm.—Apothecaries, 4 grains.

EXTRACTUM STRAMONII

Extract of Stramonium

Ext. Stramon.

Extract of Stramonium yields not less than 0.9 per cent. nor more than 1.1 per cent. of the alkaloids of stramonium. One gramme of the Extract represents about *four grammes* of stramonium.

Pilular Extract of Stramonium

Stramonium, in No. 30 powder, *one thousand grammes*....	1000 Gm.
Glucose,	
Alcohol,	
Water, each, *a sufficient quantity.*	

Moisten the powder with sufficient of a mixture of *three volumes* of alcohol and *one volume* of water and pack it in a cylindrical percolator; then add enough of this menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed gradually adding menstruum of the same strength, until the drug is exhausted. Recover the alcohol from the percolate by distillation, and evaporate the residue with frequent stirring, at a temperature not exceeding 70° C., to a pilular consistence. Mix the mass thoroughly and weigh it.

Assay a portion of this extract as directed below, and, from the alkaloidal content thus determined, ascertain by calculation the amount of alkaloids in the remainder of the mass and to this add enough glucose to make the finished Extract contain 1 per cent. of the alkaloids of stramonium. Mix thoroughly.

Assay—Proceed as directed under *Extractum Belladonnæ Foliorum* (Pilular), page 145, using 2 Gm. of Pilular Extract of Stramonium.

Each mil of tenth-normal sulphuric acid V.S. consumed corresponds to 28.92 milligrammes of the alkaloids of stramonium.

Powdered Extract of Stramonium

Stramonium, in No. 40 powder, *one thousand grammes* ...	1000 Gm.
Magnesium Oxide, *twenty grammes*....................	20 Gm.
Starch, dried at 100° C.,	
Alcohol, each, *a sufficient quantity.*	

Moisten the drug with sufficient alcohol and pack it in a cylindrical percolator; then add enough alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed very slowly, adding alcohol as required. Reserve the first *one thousand mils* of percolate and continue the percolation until the second percolate measures *one thousand mils* or until the drug is exhausted. Transfer the second percolate to a suitable apparatus and distil off the alcohol, at as low a temperature as practicable, until a residue measuring about *one hundred mils* remains, then add the reserved percolate and continue distillation until the residue in the still is of syrupy consistence.

Transfer this residue to a shallow evaporating dish, rinse the flask or still with a small quantity of warm alcohol, and add the rinsing to the contents of the dish. Evaporate this to a soft extract, with frequent stirring, at a temperature not exceeding 70° C. Then add *fifty grammes* of the dried starch and continue the heating at the same temperature, with frequent stirring, until the mass is nearly dry. Now add the magnesium oxide, thoroughly incorporate it, and set the product aside in a current of warm air, until thoroughly dry. Reduce the product to a fine powder and weigh it.

Assay a portion of this product as directed below, and, from the alkaloidal content thus determined, ascertain by calculation the amount of alkaloids in the remainder of the powder and add to this enough dried starch to make the finished Extract contain 1 per cent. of the alkaloids of stramonium. Mix the powders thoroughly, pass the Extract through a fine sieve, transfer it to small, wide-mouthed bottles and stopper them tightly.

Assay—Proceed as directed under *Extractum Belladonnæ Foliorum* (Powdered), page 146, using 3 Gm. of Powdered Extract of Stramonium.

Each mil of tenth-normal sulphuric acid V.S. consumed corresponds to 28.92 milligrammes of the alkaloids of stramonium.

Preparation—Unguentum Stramonii (from Pilular Extract).

AVERAGE DOSE—Metric, 0.01 Gm.—Apothecaries, 1/6 grain.

EXTRACTUM SUMBUL

Extract of Sumbul

Ext. Sumbul

SUMBUL, in No. 30 powder, *one thousand grammes*	1000 Gm.
ALCOHOL,	
WATER, each, *a sufficient quantity*.	

Moisten the powder with sufficient of a mixture of *four volumes* of alcohol and *one volume* of water and pack it in a cylindrical percolator; then add enough of this menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed slowly, gradually adding menstruum of the same strength until the drug is exhausted. Recover the alcohol from the percolate by distillation and evaporate the residue with frequent stirring, at a temperature not exceeding 70° C., to a pilular consistence.

Average dose—Metric, 0.25 Gm.—Apothecaries, 4 grains.

EXTRACTUM TARAXACI

Extract of Taraxacum

Ext. Tarax.

Taraxacum, in No. 30 powder, *one thousand grammes* . . . . 1000 Gm.
Alcohol,
Water, each, *a sufficient quantity.*

Mix *one hundred and twenty-five mils* of alcohol with *eight hundred and seventy-five mils* of water, and, having moistened the powder with a portion of the mixture, pack it in a cylindrical percolator, then add enough of the menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for twenty-four hours. Then allow the percolation to proceed, gradually adding menstruum of the same strength until the drug is exhausted. Recover the alcohol from the percolate by distillation and evaporate the residue with frequent stirring, on a water bath, to a pilular consistence.

Average dose—Metric, 1 Gm.—Apothecaries, 15 grains.

EXTRACTUM VIBURNI PRUNIFOLII

Extract of Viburnum Prunifolium

Ext. Viburn. Prun.—Powdered Extract of Viburnum Prunifolium

One gramme of the Extract represents *five grammes* of viburnum prunifolium.

VIBURNUM PRUNIFOLIUM, in No. 30 powder, *one thousand grammes*	1000 Gm.
MAGNESIUM OXIDE, *five grammes*	5 Gm.
STARCH, dried at 100° C.,	
DILUTED ALCOHOL, each, *a sufficient quantity,*	
To make *two hundred grammes*	200 Gm.

Moisten the powder with sufficient diluted alcohol and pack it in a cylindrical percolator; then add enough diluted alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed slowly, adding diluted alcohol as required until the viburnum prunifolium is exhausted. Recover the alcohol from the percolate by distillation at as low a temperature as practicable and evaporate the residue to a soft extract in a shallow dish on a water bath, at a temperature not exceeding 70° C. Add the magnesium oxide, incorporate it thoroughly, spread the extract on glass plates and dry it by exposure to currents of warm air. Reduce the extract to a fine powder, weigh it, and add sufficient of the dried starch to make the finished product weigh *two hundred grammes.* Mix the powder thoroughly, pass the Extract through a fine sieve, transfer it to small, wide-mouthed bottles and stopper them tightly.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

FEL BOVIS

Oxgall

The fresh bile of the ox, *Bos taurus* Linné (Fam. *Bovidæ*).

A brownish-green or dark green, somewhat viscid liquid, having a characteristic odor, and a disagreeable, bitter taste.

When Oxgall is shaken with water a frothy mixture is produced.

Specific gravity: 1.015 to 1.025 at 25° C.

It is neutral or faintly alkaline to litmus.

A mixture of 2 drops of Oxgall and 10 mils of water, when treated, first with a drop of a freshly prepared solution of 1 part of sugar in 4 parts of water, and afterwards with sulphuric acid, cautiously added, until the precipitate first formed is redissolved, gradually acquires a brownish-red color, changing successively to carmine, purple, and violet.

Preparation—Extractum Fellis Bovis.

FERRI CARBONAS SACCHARATUS

Saccharated Ferrous Carbonate

Ferr. Carb. Sacch.

Saccharated Ferrous Carbonate contains not less than 15 per cent. of $FeCO_3$ (115.84). Preserve it in small, well-stoppered bottles, exposed to light.

Ferrous Sulphate, *fifty grammes*	50 Gm.
Sodium Bicarbonate, *thirty-five grammes*	35 Gm.
Sugar of Milk, *ten grammes*	10 Gm.
Sugar, in fine powder,	
Diluted Sulphuric Acid,	
Distilled Water, each, *a sufficient quantity,*	
To make *one hundred grammes*	100 Gm.

Dissolve the ferrous sulphate in *two hundred mils* of hot distilled water, add a few drops of diluted sulphuric acid and filter. Dissolve the sodium bicarbonate in *five hundred mils* of distilled water at a temperature not exceeding 50° C., and filter. To the solution of sodium bicarbonate, contained in a flask having a capacity of about *one thousand mils*, gradually add the solution of ferrous sulphate, and mix thoroughly by rotating the flask. Fill the flask with boiling distilled water, cork it loosely, and set the mixture aside. When the precipitate has subsided, draw off the clear supernatant liquid by means of a siphon; fill the flask again with hot distilled water and shake it. Again draw off the clear liquid, and repeat the washing with hot distilled water, in the same manner, until the decanted liquid gives merely a slight cloudiness with barium chloride T.S. Drain the precipitate, and transfer it to a porcelain dish containing *seventy grammes* of sugar and *ten grammes* of sugar of milk and mix intimately. Evaporate the mixture to dryness on a water bath, reduce it to powder, weigh, and mix intimately with it, if necessary, enough well-dried sugar to make the product weigh *one hundred grammes.* To minimize oxidation make this preparation in the shortest possible time.

Saccharated Ferrous Carbonate is a greenish-brown powder, gradually becoming oxidized by contact with air; odorless, and having at first a sweetish, afterwards slightly ferruginous, taste.

Saccharated Ferrous Carbonate is only partially soluble in water, but is completely dissolved on the addition of hydrochloric acid, with copious evolution of carbon dioxide, forming a clear, greenish-yellow liquid.

Dissolve 1 Gm. of Saccharated Ferrous Carbonate in 5 mils of hydrochloric acid, and dilute the solution with distilled water until it measures 100 mils.

Portions of this solution yield a blue precipitate with either potassium ferrocyanide T.S. or potassium ferricyanide T.S.; another 10 mil portion of the solution shows not more than a slight turbidity with barium chloride T.S. (*sulphate*).

Assay—Dissolve about 2 Gm. of Saccharated Ferrous Carbonate, accurately weighed, in 15 mils of diluted sulphuric acid, and dilute the solution with distilled water to about 100 mils. Titrate immediately with tenth-normal potassium dichromate V.S., potassium ferricyanide T.S. being used as indicator. It shows not less than 15 per cent. of $FeCO_3$.

Each mil of tenth-normal potassium dichromate V.S. used corresponds to 0.011584 Gm. of $FeCO_3$. Each gramme of Saccharated Ferrous Carbonate corresponds to not less than 13 mils of tenth-normal potassium dichromate V.S.

AVERAGE DOSE—Metric, 0.25 Gm.—Apothecaries, 4 grains.

FERRI CHLORIDUM

Ferric Chloride

Ferr. Chlor.—Iron Perchloride Sesquichloride of Iron

It contains $FeCl_3$ (162.22) in a hydrated form corresponding to not less than 20 per cent. of Fe. Preserve it in well-closed glass containers.

Ferric Chloride occurs in orange-yellow, crystalline pieces, odorless, or with a faint odor of hydrochloric acid, and having a strongly styptic taste. It is very deliquescent in air.

One Gm. of Ferric Chloride dissolves in 0.2 mil of water at 25° C.; freely soluble in alcohol and soluble in glycerin or ether.

At about 35.5° C. the salt fuses to a reddish-brown liquid. When strongly heated, it decomposes, losing some ferric chloride, water and hydrochloric acid and leaving a residue of ferric oxide.

An aqueous solution of Ferric Chloride, made by dissolving 10 Gm. of the salt in 15 mils of distilled water, responds to the tests for identity and purity under *Liquor Ferri Chloridi*, omitting the test for hydrochloric acid.

Assay—Dissolve about 1 Gm. of Ferric Chloride, accurately weighed in a stoppered weighing-bottle, in 25 mils of distilled water, add 3 mils of hydrochloric acid and 4 Gm. of potassium iodide, and allow the mixture to stand in a glass-stoppered flask or bottle for thirty minutes at a temperature of 40° C. Cool this solution, then dilute it with 100 mils of distilled water and titrate with tenth-normal sodium thiosulphate V.S., using starch T.S. as indicator. It shows not less than 20 per cent. of Fe.

Each mil of tenth-normal sodium thiosulphate V.S. used corresponds to 0.005584 Gm. of Fe. Each gramme of Ferric Chloride corresponds to not less than 35.8 mils of tenth-normal sodium thiosulphate V.S.

AVERAGE DOSE—Metric, 0.06 Gm.—Apothecaries, 1 grain.

FERRI ET AMMONII CITRAS

Iron and Ammonium Citrate

Ferr. et Ammon. Cit.—Soluble Ferric Citrate Ammonio-ferric Citrate

Ferric citrate rendered more readily soluble by the presence of ammonium citrate and containing not less than 16 per cent. nor more than

18 per cent. of Fe. Preserve it in well-closed containers, protected from light.

Iron and Ammonium Citrate occurs as thin, transparent, garnet-red scales, odorless and having a saline, mildly ferruginous taste. It is deliquescent in moist air.

Iron and Ammonium Citrate is readily and completely soluble in water; insoluble in alcohol.

An aqueous solution (1 in 20) is neutral or but slightly acid or alkaline to litmus.

When strongly heated, it chars, and finally leaves a residue of ferric oxide.

Heat Iron and Ammonium Citrate with potassium hydroxide T.S.; it yields a brownish-red precipitate, and ammonia is evolved.

Ammonia water, added to an aqueous solution, produces no precipitate, but darkens the solution.

Remove the iron from 10 mils of an aqueous solution of Iron and Ammonium Citrate (1 in 10) by boiling it with an excess of potassium hydroxide T.S., filter, and then slightly acidulate the filtrate with acetic acid. A portion of the cooled filtrate, when mixed with 2 mils of calcium chloride T.S., and again heated to boiling, gradually deposits a white crystalline precipitate. Another portion of the filtrate, when acidulated more strongly with acetic acid and allowed to stand for twenty-four hours, does not yield a white crystalline precipitate (*tartrate*).

An aqueous solution of Iron and Ammonium Citrate (1 in 100) does not yield a blue precipitate with potassium ferrocyanide T.S. unless it is acidulated with hydrochloric acid (difference from *ferric citrate*).

Assay—Dissolve about 1 Gm. of Iron and Ammonium Citrate, accurately weighed, in 25 mils of distilled water and 7 mils of hydrochloric acid, in a glass-stoppered flask or bottle, add 4 Gm. of potassium iodide, stopper the bottle securely and keep it at a temperature of 40° C. for thirty minutes. Then cool, and titrate with tenth-normal sodium thiosulphate V.S., using starch T.S. as indicator. It shows not less than 16 per cent. nor more than 18 per cent of Fe.

Each mil of tenth-normal sodium thiosulphate V.S. used corresponds to 0.005584 Gm. of Fe. Each gramme of Iron and Ammonium Citrate corresponds to not less than 28.6 mils nor more than 32.2 mils of tenth-normal sodium thiosulphate V.S.

AVERAGE DOSE—Metric, 0.25 Gm.—Apothecaries, 4 grains.

FERRI ET QUININÆ CITRAS

Iron and Quinine Citrate

Ferr. et Quin. Cit.—Ferri et Quininæ Citras Solubilis, U.S.P. VIII
Soluble Iron and Quinine Citrate

Iron citrate and quinine citrate rendered more soluble by the presence of ammonium citrate and containing not less than 11.5 per cent. of anhydrous quinine ($C_{20}H_{24}O_2N_2$) and not less than 13 per cent. of Fe. Preserve it in amber-colored, well-stoppered bottles, protected from light.

Iron and Quinine Citrate occurs as thin, transparent scales, of a greenish or golden-yellow color, odorless, and having a bitter, mildly ferruginous taste. It is deliquescent.

Iron and Quinine Citrate is rapidly and completely soluble in cold water, partly soluble in alcohol.

An aqueous solution (1 in 10) is acid to litmus.

When strongly heated, Iron and Quinine Citrate chars, and finally leaves a residue of ferric oxide.

When heated with potassium hydroxide T.S., a brown precipitate is produced and ammonia is evolved.

On the addition of a slight excess of ammonia water to an aqueous solution of Iron and Quinine Citrate (1 in 10), the color of the liquid is deepened, and a white, curdy precipitate is produced.

A portion of the filtrate from this precipitate does not yield a blue color or precipitate with potassium ferrocyanide T.S. unless it is acidulated with hydrochloric acid.

Boil an aqueous solution of Iron and Quinine Citrate (1 in 10) with an excess of potassium hydroxide T.S. until completely precipitated, and slightly acidulate the filtrate with acetic acid. A portion of the cooled filtrate, mixed with 2 mils of calcium chloride T.S. and again heated to boiling, gradually deposits a white, crystalline precipitate. Another portion of the filtrate, more strongly acidulated with acetic acid and allowed to stand for twenty-four hours, does not yield a white, crystalline precipitate (*tartrate*).

Assay for Quinine—Dissolve about 1 Gm. of Iron and Quinine Citrate, accurately weighed, in 20 mils of distilled water in a separator, add 5 mils of ammonia water and 10 mils of chloroform, and shake the separator for one minute. Allow the liquids to separate, draw off the chloroform layer through a small filter moistened with chloroform, into a tared dish, and shake the residuary liquid a second and a third time with portions of 10 mils each of chloroform, passing the chloroform through the filter each time and finally washing the filter with 5 mils of chloroform. Evaporate the combined chloroform solutions, redissolve the residue in 3 mils of alcohol, again evaporate and then dry the residue to constant weight at 100° C. This residue corresponds to not less than 11.5 per cent. of the amount of Iron and Quinine Citrate taken for the assay and conforms to the identity tests under *Quinina*.

Assay for Iron—Heat the aqueous liquid, from which the quinine has been removed in the manner just described, on a water bath, until the odors of chloroform and of ammonia have disappeared, allow to cool and dilute with distilled water to a volume of 25 mils. Transfer the liquid to a glass-stoppered bottle, add 15 mils of hydrochloric acid and 3 Gm. of potassium iodide, and, after securely closing the bottle, allow the mixture to stand for thirty minutes at 40° C. Then cool and titrate with sodium thiosulphate V.S., using starch T.S. as indicator. It shows not less than 13 per cent. of Fe.

Each mil of tenth-normal sodium thiosulphate V.S. used corresponds to 0.005584 Gm. of Fe. Each gramme of Iron and Quinine Citrate corresponds to not less than 23.3 mils of tenth-normal sodium thiosulphate V.S.

AVERAGE DOSE—Metric, 0.25 Gm.—Apothecaries, 4 grains.

FERRI HYDROXIDUM CUM MAGNESII OXIDO

Ferric Hydroxide with Magnesium Oxide

Ferr. Hydrox. cum Mag. Oxid.—Arsenic Antidote Ferric Hydrate with Magnesia

SOLUTION OF FERRIC SULPHATE, *forty milliliters*..........	40 mils
MAGNESIUM OXIDE, *ten grammes*........................	10 Gm.
WATER, *a sufficient quantity*.	

Mix the solution of ferric sulphate with *one hundred and twenty-five mils* of water, and keep the liquid in a large, well-stoppered bottle. Rub the magnesium oxide with cold water to a smooth and thin mixture, transfer this to a bottle capable of holding about *one thousand mils,* fill it with water to about three-fourths of its capacity, and keep it tightly stoppered. When the preparation is wanted for use, shake the magnesium oxide mixture until of a thin, creamy consistence, slowly add to it the diluted solution of ferric sulphate, and shake them together until a uniformly smooth mixture results.

NOTE—In this process the 10 Gm. of magnesium oxide may be replaced by 300 mils of magnesia magma, diluting it with sufficient water to make the required volume.

Always keep the diluted solution of ferric sulphate and the magnesia mixture on hand in separate bottles, ready for immediate use, so that the antidote may be quickly prepared.

AVERAGE DOSE—Metric, 120 mils—Apothecaries, 4 fluidounces.

FERRI PHOSPHAS

Ferric Phosphate

Ferr. Phos.—Ferri Phosphas Solubilis, U.S.P. VIII
Soluble Ferric Phosphate

Ferric Phosphate rendered soluble by the presence of sodium citrate. It contains not less than 12 per cent. of Fe. Preserve it in amber-colored, well-stoppered bottles, protected from light.

Ferric Phosphate occurs as thin, bright green, transparent scales, without odor, and having an acidulous, slightly saline taste. The salt is permanent in dry air when excluded from light, but when unprotected, soon becomes discolored.

Ferric Phosphate is freely and completely soluble in water; insoluble in alcohol.

An aqueous solution of Ferric Phosphate (1 in 10) is slightly acid to litmus.

The addition of ammonia water to an aqueous solution of Ferric Phosphate gives a reddish-brown color, but does not produce a precipitate.

Ferric Phosphate, when boiled with potassium hydroxide T.S., produces a brownish-red precipitate without evolving ammonia.

Boil an aqueous solution of Ferric Phosphate (1 in 10) with an excess of potassium hydroxide T.S. until deprived of its iron, strongly acidulate the filtrate with hydrochloric acid and cool a portion of the liquid. When mixed with an equal volume of magnesia mixture T.S., followed by a slight excess of ammonia water, this liquid affords an abundant, white, crystalline precipitate. This precipitate turns yellow when washed and treated with a few drops of silver nitrate T.S. (distinction from *pyrophosphate*).

Assay—Dissolve about 1 Gm. of Ferric Phosphate, accurately weighed, in 25 mils of distilled water and 15 mils of hydrochloric acid in a glass-stoppered bottle, then add 3 Gm. of potassium iodide, securely stopper the bottle, keep it at a temperature of 40° C. for thirty minutes, then cool and titrate with tenth-normal sodium thiosulphate V.S., using starch T.S. as indicator. It shows not less than 12 per cent. of Fe.

Each mil of tenth-normal sodium thiosulphate V.S. used corresponds to 0.005584 Gm. of Fe. Each gramme of Ferric Phosphate corresponds to not less than 21.5 mils of tenth-normal sodium thiosulphate V.S.

AVERAGE DOSE—Metric, 0.25 Gm.—Apothecaries, 4 grains.

FERRI SULPHAS

Ferrous Sulphate

Ferr. Sulph.—Iron Protosulphate

It contains not less than 54.36 nor more than 57.07 per cent. of anhydrous ferrous sulphate, corresponding to about 99.5 per cent. of the crystallized salt [$FeSO_4+7H_2O=278.02$]. Preserve it in well-closed containers.

Ferrous Sulphate occurs as pale bluish-green, monoclinic prisms, without odor, and having a saline, styptic taste; efflorescent in dry air. On exposure to moist air, the crystals rapidly oxidize, and become coated with brownish-yellow, basic ferric sulphate. When it has thus deteriorated the salt must not be used for any official purpose.

One Gm. of Ferrous Sulphate dissolves in 1.4 mils of water at 25° C.; in 0.4 mil of boiling water; insoluble in alcohol.

An aqueous solution of the salt (1 in 20) is acid to litmus.

When slowly heated to 115° C., the crystals disintegrate, and the salt loses the greater part of its water of crystallization.

An aqueous solution of the salt, even when highly diluted, gives with potassium ferricyanide T.S. a blue color or precipitate, and with barium chloride T.S. a white precipitate insoluble in hydrochloric acid.

Dissolve 1 Gm. of the salt in about 50 mils of distilled water containing 1 mil of diluted sulphuric acid, heat the solution to boiling, oxidize it with nitric acid and then mix it with a slight excess of ammonia water and filter. The filtrate is colorless, and, after acidulating with hydrochloric acid, it does not respond to the Test for heavy metals (see Part II, Test No. 3).

Agitate 1 Gm. of Ferrous Sulphate in small fragments during four or five minutes, with 10 mils of alcohol, and filter the mixture; the filtrate does not immediately redden moistened blue litmus paper (*free acid*).

Assay—Dissolve about 1 Gm. of Ferrous Sulphate, accurately weighed, in about 25 mils of diluted sulphuric acid and titrate with tenth-normal potassium permanganate V.S. until a permanent pink color is produced. It shows not less than 54.36 per cent. nor more than 57.07 per cent. of $FeSO_4$.

Each mil of tenth-normal potassium permanganate V.S. used corresponds to 0.015191 Gm. of $FeSO_4$. Each gramme of Ferrous Sulphate corresponds to not less than 35.78 mils nor more than 37.57 mils of tenth-normal potassium permanganate V.S.

Preparations—Ferri Sulphas Exsiccatus Ferri Sulphas Granulatus.

AVERAGE DOSE—Metric, 0.1 Gm.—Apothecaries, 1½ grains.

FERRI SULPHAS EXSICCATUS

Exsiccated Ferrous Sulphate

Ferr. Sulph. Exsic.—Dried Ferrous Sulphate

Exsiccated Ferrous Sulphate contains the equivalent of not less than 80 per cent. of the anhydrous salt [$FeSO_4 = 151.91$].

FERROUS SULPHATE, in coarse powder, *one hundred grammes*	100 Gm.

Allow the salt to effloresce at a temperature of about 40° C. in dry air, and then heat it in a porcelain dish on a water bath, constantly stirring, until the product weighs from *sixty-four* to *sixty-five grammes*. Lastly, reduce the residue to a fine powder, and transfer it at once to dry, well-stoppered bottles.

Exsiccated Ferrous Sulphate is a grayish-white powder, slowly soluble in water. A solution of the salt (1 in 20) in distilled water which has been recently boiled and cooled is not more than slightly turbid, and conforms to the reactions and tests under *Ferri Sulphas*, except the test for free acid, when taken in proportionate amount.

Assay—Dissolve about 0.8 Gm. of Exsiccated Ferrous Sulphate, accurately weighed in a stoppered weighing-bottle, in about 25 mils of diluted sulphuric acid and titrate with tenth-normal potassium permanganate V.S. until a permanent pink color is produced. It shows not less than 80 per cent. of $FeSO_4$.

Each mil of tenth-normal potassium permanganate V.S. used corresponds to 0.015191 Gm. of $FeSO_4$. Each gramme of Exsiccated Ferrous Sulphate corresponds to not less than 52.7 mils of tenth-normal potassium permanganate V.S.

AVERAGE DOSE—Metric, 0.06 Gm.—Apothecaries, 1 grain.

FERRI SULPHAS GRANULATUS

Granulated Ferrous Sulphate

Ferr. Sulph. Gran.—Precipitated Ferrous Sulphate

FERROUS SULPHATE, *one hundred grammes*	100 Gm.
DISTILLED WATER, *one hundred milliliters*	100 mils
DILUTED SULPHURIC ACID, *five milliliters*	5 mils
ALCOHOL, *twenty-five milliliters*	25 mils

Dissolve the ferrous sulphate in the distilled water previously heated to boiling, add the diluted sulphuric acid, and filter the solution while hot. Evaporate the solution immediately in a tared porcelain dish on a sand bath until it weighs *one hundred and fifty grammes*, and then cool it quickly with constant stirring. Transfer the product to a glass funnel stopped with a plug of purified cotton, and, when it has thoroughly drained, pour the alcohol upon it. When this has also drained spread the crystalline powder on bibulous paper, dry it quickly at room temperature, and transfer it at once to dry, well-stoppered bottles.

Granulated Ferrous Sulphate is a very pale bluish-green, crystalline powder, which conforms in every respect to the reactions and tests for purity under *Ferri Sulphas.*

Average dose—Metric, 0.1 Gm.—Apothecaries, 1½ grains.

FERRUM

Iron

Ferr.

Metallic iron [Fe=55.84] in the form of fine, bright wire.

FERRUM REDUCTUM

Reduced Iron

Ferr. Reduct.—Ferrum Redactum Iron by Hydrogen Quevenne's Iron

Iron reduced to the metallic state by the action of hydrogen upon ferric oxide. It contains not less than 90 per cent. of metallic iron [Fe=55.84]. Preserve it in well-closed containers.

Reduced Iron occurs as a very fine, grayish-black, lusterless powder, without odor or taste; permanent in dry air.

Reduced Iron is insoluble in water or alcohol.

When ignited in contact with air, it glows and is converted into black ferroso-ferric oxide.

Shake 1 Gm. of Reduced Iron with 5 mils of distilled water and filter; the liquid does not change the color of litmus.

One Gm. of Reduced Iron, when treated with 20 mils of diluted sulphuric acid in a flask, causes the evolution of nearly odorless hydrogen gas, which does not affect paper moistened with lead acetate T.S. within two minutes (*sulphide*), and, on applying a gentle heat, the Iron dissolves in the acid without leaving more than 1 per cent. of residue.

Add 20 mils of diluted sulphuric acid to 0.5 Gm. of Reduced Iron contained in a small, covered beaker, and, after the reaction has somewhat subsided, warm the liquid on a water bath until the reaction ceases. Collect any minute, undissolved residue upon a very small filter, rinse the beaker with distilled water, add the rinsings to the filter, and then wash the residue with distilled water until free from acid reaction. Transfer the residue to the beaker by rinsing it back, and, after adding about 0.25 Gm. of potassium chlorate and 5 mils of hydrochloric acid, slowly evaporate the solution to dryness on a water bath. Dissolve the residue in sufficient distilled water to measure 50 mils, and add 5 mils of this solution to 5 mils of a saturated solution of sulphurous acid and heat the liquid on a water bath for fifteen minutes, or until all traces of sulphurous acid have been removed. The resulting solution meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Assay—Introduce into a 100 mil flask about 1 Gm. of Reduced Iron, previously well triturated and accurately weighed, and add 10 Gm. of finely powdered mercuric chloride and 50 mils of boiling distilled water. Boil the mixture for five minutes, shaking it frequently, then fill the flask to the 100 mil mark with distilled water, recently boiled and cooled, and cool it to room temperature. Again fill the flask to the mark with distilled water, stopper, agitate the contents well, and allow it to stand for a few minutes. Now filter the contents of the flask and immediately titrate 20 mils of the filtrate to which has been added 20 mils of diluted sulphuric acid, with tenth-normal potassium permanganate V.S. until a permanent pink color is produced. It shows not less than 90 per cent. of Fe when calculated from the original weight of Reduced Iron taken.

Each mil of tenth-normal potassium permanganate V.S. used corresponds to 0.005584 Gm. of Fe. Each gramme of Reduced Iron corresponds to not less than 161.2 mils of tenth-normal potassium permanganate V.S.

AVERAGE DOSE—Metric, 0.06 Gm.—Apothecaries, 1 grain.

FLUIDEXTRACTA

Fluidextracts

Fluidextracts are concentrated liquid preparations of vegetable drugs, containing alcohol either as a solvent or as a preservative, and bearing a uniform relation to the drug used so that *one mil* of the fluidextract closely represents the activity of *one gramme* of the air-dried and powdered drug of standard quality.

The fluidextracts of this Pharmacopœia, with few exceptions, may be classified according to the menstrua used in the extraction of the drugs and the processes of manufacture employed. Several drugs require special manipulation to obtain satisfactory fluidextracts, and for these appropriate formulas have been devised and are printed in full in the text. The following type processes are described, and in each formula the process to be used is designated by reference to the type process:

Type Process A—In this class are included those fluidextracts that are made with a menstruum of alcohol or a mixture of alcohol and water by the usual process of percolation.

Type Process B—In this class are included those fluidextracts in which glycerin or an acid is used in the extraction and two menstrua are successively employed. Menstruum I contains the glycerin or acid in definite proportion to the amount of the drug, and Menstruum II, a mixture of alcohol and water intended for completing the exhaustion of the drug.

Type Process C—The process of *fractional* or *divided percolation.* This is especially recommended for drugs containing volatile ingredients or constituents injured by exposure to heat. This process may likewise be used as an alternative process in the formulas in which Type Process A is directed.

Type Process D—In this class are included those fluidextracts in which extraction is effected by infusion and percolation with boiling water, alcohol being added to the concentrated liquid as a preservative.

In the preparation of fluidextracts by either Process A, B, or C, the rate of percolation must be carefully controlled and, for the quantities directed in the formulas of the Pharmacopœia, the flow should not exceed ten drops per minute until the reserved percolate is collected, and twenty drops per minute thereafter. As a rule *one thousand grammes* of powdered drug may be exhausted by percolation with sufficient menstruum to yield *three thousand mils* of percolate.

Fluidextracts should be kept in tightly-stoppered containers for one month and then, if perfectly clear, they should be stored in amber-colored bottles protected from sunlight and extremes of temperature. If sedimentation has occurred the clear portion should be decanted, the remainder filtered and the liquids thoroughly mixed before storing.

The percentage of alcohol in fluidextracts made by type processes A, B, or C is variable and always less than that in the menstruum employed, due, among other causes, to loss of alcohol by evaporation during manufacture, to the presence of a variable proportion of water in the air-dried drug, and to the extraction from the drug of its soluble constituents, which also often vary greatly in different lots of the same drug. The percentage of alcohol in the finished product can therefore only be ascertained by an actual determination (see Determination of Alcohol in Official Preparations, Part II, No. 14).

Type Processes

Type Process A—Moisten *one thousand grammes* of the powdered drug directed with a sufficient quantity of the prescribed menstruum to render it evenly and distinctly damp and to maintain it so, after macerating for six hours in a tightly-covered container. Then pack it in a cylindrical percolator and add enough of the menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed slowly, gradually adding more menstruum until the drug is exhausted. Reserve the first *eight hundred and fifty mils* of the percolate (unless otherwise specified in the formula); recover the alcohol from the remainder and concentrate the residue to a soft extract at a temperature not exceeding 60° C.; dissolve this in the reserved portion, mix thoroughly, and finally add a sufficient quantity of the menstruum to obtain *one thousand mils* or the volume determined by calculation from the assay.

Type Process B—Moisten *one thousand grammes* of the powdered drug directed with a sufficient quantity of the prescribed Menstruum I, to render it evenly and distinctly damp and to maintain it so after macerating for six hours in a tightly-covered container. Then pack it in a cylindrical percolator, add the remainder of Menstruum I, and, when this has just disappeared from the surface, gradually add Menstruum II, constantly maintaining a stratum of liquid above the drug. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours, and then allow the percolation to proceed slowly, gradually adding Menstruum II until the drug is exhausted. Reserve the first *eight hundred and fifty mils* of the percolate (unless otherwise specified in the formula); recover the alcohol from the remainder and concentrate the residue to a soft extract at a temperature not exceeding 60° C.; dissolve this in the reserved portion, mix thoroughly, and finally add a sufficient quantity of Menstruum II to obtain *one thousand mils*, or the volume determined by calculation from the assay.

Type Process C—Divide *one thousand grammes* of the powdered drug directed into three portions of *five hundred grammes, three hundred grammes*, and *two hundred grammes*, respectively. Moisten the first portion of the drug (500 Gm.) with a sufficient quantity of the prescribed menstruum to render it evenly and distinctly damp and to maintain it so after macerating for six hours in a tightly-covered container. Then pack it in a cylindrical percolator and add enough of the menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours and then allow the percolation to proceed slowly, gradually adding more of the menstruum. Reserve the first *two hundred mils* of percolate and continue the process until the additional percolate measures *fifteen hundred mils*, the latter being collected in successive portions of *three hundred mils* each.

Moisten the second portion of the powdered drug (300 Gm.) with a sufficient quantity of the percolate collected in the preceding operation immediately after the reserved portion, to render it evenly and distinctly damp and to maintain it so after macerating for six hours in a tightly-covered container. Then pack it in a cylindrical percolator and macerate and percolate as directed for the first part of the drug, using as menstruum the several portions of percolate from the preceding operation in the order in which they have been collected, and, if this be insufficient, follow with some of the original menstruum. Reserve the first *three* *hundred mils* of percolate and continue the process until the additional percolate measures *eight hundred mils*, collecting the weaker percolate in successive portions of *two hundred mils* each.

Moisten the third portion of the powdered drug (200 Gm.) with a sufficient quantity of the percolate collected in the preceding operation immediately after the reserved portion, to render it evenly and distinctly damp and to maintain it so after macerating for six hours in a tightly-covered container. Then pack it in a cylindrical percolator and macerate and percolate as before, using as menstruum the several portions of percolate from the preceding operation in the order in which they have been collected, and, if this be insufficient, follow with more of the original menstruum. Collect *five hundred mils* of percolate and mix this with the two portions previously reserved so as to make *one thousand mils* of finished fluidextract.

When Type Process C is directed for fluidextracts which are adjusted by assay to a definite alkaloidal standard, collect only *four hundred and twenty mils* of percolate from the third portion of drug instead of the *five hundred mils* directed above. Mix this percolate with the two portions previously reserved, assay a portion of the mixture and then adjust its volume, by the addition of the menstruum directed, so that each *one hundred mils* of finished fluidextract will contain the prescribed amount of alkaloid.

Type Process D—To *one thousand grammes* of the ground drug add *five thousand mils* of boiling water, mix thoroughly and allow it to macerate in a covered container for two hours in a warm place. Then transfer the moist drug to a tinned or enameled metallic percolator and allow percolation to proceed, gradually adding boiling water until the drug is exhausted. Evaporate the percolate on a water bath or steam bath to the volume specified and when cold add the alcohol directed and mix thoroughly.

FLUIDEXTRACTUM ACONITI

Fluidextract of Aconite

Fldext. Aconit.—Fluid Extract of Aconite

One hundred mils of Fluidextract of Aconite yields not less than 0.45 Gm. nor more than 0.55 Gm. of the ether-soluble alkaloids of aconite. If assayed biologically the minimum lethal dose should not be greater than 0.00004 mil for each gramme of body weight of guinea-pig.

ACONITE, in No. 40 powder, *one thousand grammes* . . . . . . 1000 Gm.

Prepare a Fluidextract by Type Process C, as modified for alkaloidal drugs (see page 175), using a mixture of *three volumes* of alcohol and *one volume* of water as the menstruum and adjusting the volume of the finished Fluidextract so that each *one hundred mils* contains 0.5 Gm. of the ether-soluble alkaloids of aconite.

Assay—From a pipette drop 15 mils of Fluidextract of Aconite evenly over the surface of 15 Gm. of purified sawdust (see page 546) and evaporate to dryness at a temperature not exceeding 75° C. Transfer the mixture to a 250 mil flask, add 150 mils of ether, and proceed as directed under *Belladonnæ Radix*, page 73, third line of the Assay, modifying the process there given by using the ammonia water with a small quantity of distilled water to rinse the dish in which the mixture was evaporated, and ether only in the final shaking out of the alkaloids.

Each mil of tenth-normal sulphuric acid V.S. consumed corresponds to 64.539 milligrammes of the ether-soluble alkaloids of aconite.

For an alternative method of assaying Fluidextract of Aconite see Biological Assays (Part II).

Average dose—Metric, 0.03 mil—Apothecaries, ½ minim.

FLUIDEXTRACTUM AROMATICUM

Aromatic Fluidextract

Fldext. Aromat.—Aromatic Fluid Extract

Aromatic Powder, *one thousand grammes*............... 1000 Gm.

Prepare a Fluidextract by Type Process C (see page 175), using alcohol as the menstruum.

Average dose—Metric, 1 mil—Apothecaries, 15 minims.

FLUIDEXTRACTUM ASPIDOSPERMATIS

Fluidextract of Aspidosperma

Fldext. Aspidosp.—Fluid Extract of Aspidosperma Fluidextract of Quebracho

Aspidosperma, in No. 30 powder, *one thousand grammes*.. 1000 Gm.

Prepare a Fluidextract by Type Process B (see page 175), using a mixture of *one hundred and ten mils* of glycerin, *six hundred and seventy mils* of alcohol and *two hundred and twenty mils* of water as Menstruum I, and a mixture of *two volumes* of alcohol and *one volume* of water as Menstruum II.

Average dose—Metric, 4 mils—Apothecaries, 1 fluidrachm.

FLUIDEXTRACTUM AURANTII AMARI

Fluidextract of Bitter Orange Peel

Fldext. Aurant. Amar.—Fluid Extract of Bitter Orange Peel

Bitter Orange Peel, in No. 20 powder, *one thousand grammes*	1000 Gm.

Prepare a Fluidextract by Type Process C (see page 175), using a mixture of *three volumes* of alcohol and *one volume* of water as the menstruum.

Average dose—Metric, 1 mil—Apothecaries, 15 minims.

FLUIDEXTRACTUM BELLADONNÆ RADICIS

Fluidextract of Belladonna Root

Fldext. Bellad. Rad.—Fluid Extract of Belladonna Root

One hundred mils of Fluidextract of Belladonna Root yields not less than 0.405 Gm. nor more than 0.495 Gm. of the alkaloids of belladonna root.

Belladonna Root, in No. 40 powder, *one thousand grammes*	1000 Gm.

Prepare a Fluidextract by Type Process A (see page 174), using a mixture of *five volumes* of alcohol and *one volume* of water as the menstruum, and reserving the first *eight hundred mils* of the percolate.

After dissolving the soft extract in the reserve liquid, assay a portion as directed below, and, from the result thus obtained, ascertain by calculation the amount of alkaloids in the remainder of the liquid and dilute this with enough menstruum to make each *one hundred mils* of the finished Fluidextract contain 0.45 Gm. of the alkaloids of belladonna root.

Assay—Introduce 10 mils of Fluidextract of Belladonna Root into a separator and add 10 mils of distilled water and 2 mils of ammonia water. Completely extract the alkaloids by shaking out repeatedly with chloroform and then extract the alkaloids from the chloroform solution by shaking out repeatedly with weak sulphuric acid until the alkaloids are completely removed. Collect the acid washings in a separator, add ammonia water until the solution is decidedly alkaline to litmus, and completely extract the alkaloids by shaking out repeatedly with chloroform. Evaporate the combined chloroform washings to dryness, dissolve the alkaloids from the residue in exactly 5 mils of tenth-normal sulphuric acid V.S. and titrate the excess of acid with fiftieth-normal potassium hydroxide V.S., using cochineal T.S. as indicator.

Each mil of tenth-normal sulphuric acid V.S. consumed corresponds to 28.92 milligrammes of the alkaloids of belladonna root (see Proximate Assays, Part II).

Preparation—Linimentum Belladonnæ.

Average dose—Metric, 0.05 mil—Apothecaries, 1 minim.

FLUIDEXTRACTUM BUCHU

Fluidextract of Buchu

Fldext. Buchu—Fluid Extract of Buchu

Buchu, in No. 40 powder, *one thousand grammes*......... 1000 Gm.

Prepare a Fluidextract by Type Process A (see page 174), using alcohol as the menstruum.

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

FLUIDEXTRACTUM CANNABIS

Fluidextract of Cannabis

Fldext. Cannab.—Fluidextractum Cannabis Indicæ, U.S.P. VIII
Fluid Extract of Cannabis

When assayed biologically Fluidextract of Cannabis produces incoordination when administered to dogs in a dose of not more than 0.03 mil per kilogramme of body weight.

Cannabis, in No. 30 powder, *one thousand grammes* . ... 1000 Gm.

Prepare a Fluidextract by Type Process A (see page 174), using alcohol as the menstruum.

After dissolving the soft extract in the reserve liquid, assay a portion as directed below and from the result thus obtained adjust the volume of the finished Fluidextract to conform to the above biological standard.

Assay—Proceed as directed under Biological Assays (Part II).

Average dose—Metric, 0.1 mil—Apothecaries, 1½ minims.

FLUIDEXTRACTUM CASCARÆ SAGRADÆ

Fluidextract of Cascara Sagrada

Fldext. Cascar. Sagr.—Fluidextractum Rhamni Purshianæ, U.S.P. VIII
Fluid Extract of Cascara Sagrada

Cascara Sagrada, in No. 40 powder, *one thousand grammes* 1000 Gm.
Alcohol, *two hundred and fifty milliliters*............... 250 mils

Prepare a Fluidextract by Type Process D (see page 176). Evaporate the aqueous percolate to *seven hundred and fifty mils* and when cold gradually add the alcohol and, if necessary, sufficient water to make the product measure *one thousand mils.*

Average dose—Metric, 1 mil—Apothecaries, 15 minims.

FLUIDEXTRACTUM CASCARÆ SAGRADÆ AROMATICUM

Aromatic Fluidextract of Cascara Sagrada

Fldext. Cascar. Sagr. Arom.—Fluidextractum Rhamni Purshianæ Aromaticum, U.S.P. VIII Aromatic Fluid Extract of Cascara Sagrada

Cascara Sagrada, in No. 40 powder, *one thousand grammes*	1000.0 Gm.
Magnesium Oxide, *one hundred and twenty-five grammes*	125.0 Gm.
Pure Extract of Glycyrrhiza, *forty grammes*	40.0 Gm.
Glycerin, *two hundred milliliters*	200.0 mils
Alcohol, *two hundred and fifty milliliters*	250.0 mils
Benzosulphinide, *one gramme*	1.0 Gm.
Oil of Anise, *two and five-tenths milliliters*	2.5 mils
Oil of Cinnamon, *two-tenths of a milliliter*	0.2 mil
Oil of Coriander, *one-tenth of a milliliter*	0.1 mil
Methyl Salicylate, *two-tenths of a milliliter*	0.2 mil
Boiling Water, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Thoroughly mix the cascara sagrada with the magnesium oxide, moisten the mixture with *two thousand mils* of boiling water, set it aside for two hours, stirring occasionally, and then pack it in a percolator. Now pour on boiling water and allow the percolation to proceed until the drug is exhausted. Evaporate the percolate to *five hundred mils* and while yet warm dissolve in it the extract of glycyrrhiza. When cold, add the glycerin, then the alcohol in which the benzosulphinide and the oils have been dissolved, and finally sufficient water to make the Fluidextract measure *one thousand mils.*

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

FLUIDEXTRACTUM CIMICIFUGÆ

Fluidextract of Cimicifuga

Fldext. Cimicif.—Fluid Extract of Cimicifuga Fluidextract of Black Cohosh Fluidextract of Black Snakeroot

Cimicifuga, in No. 40 powder, *one thousand grammes*..... 1000 Gm.

Prepare a Fluidextract by Type Process A (see page 174), using alcohol as the menstruum.

Average dose—Metric, 1 mil—Apothecaries, 15 minims.

FLUIDEXTRACTUM CINCHONÆ

Fluidextract of Cinchona

Fldext. Cinchon.—Fluid Extract of Cinchona   Fluidextract of Calisaya Bark

One hundred mils of Fluidextract of Cinchona yields not less than 4 Gm. nor more than 5 Gm. of the alkaloids of cinchona.

Cinchona, in No. 40 powder, *one thousand grammes* ...... 1000 Gm.

Prepare a Fluidextract by Type Process B (see page 175), using a mixture of *one hundred mils* of glycerin, *one hundred mils* of diluted hydrochloric acid and *eight hundred mils* of alcohol as Menstruum I and a mixture of *four volumes* of alcohol and *one volume* of water as Menstruum II.

After dissolving the soft extract in the reserve liquid, assay a portion as directed below, and, from the result thus obtained, ascertain by calculation the amount of alkaloids in the remainder of the liquid, and dilute this with enough of Menstruum II to make each *one hundred mils* of the finished Fluidextract contain 4.5 Gm. of the total alkaloids of cinchona.

Assay—From a pipette drop 5 mils of Fluidextract of Cinchona evenly over the surface of 10 Gm. of purified sawdust (see page 546) and evaporate it to dryness at a temperature not exceeding 80° C. Transfer the mixture to a 500 mil flask, and proceed as directed under *Cinchona*, page 112, second line of the Assay, modifying the process there given by increasing the amount of ammonia water to 10 mils, using this in divided portions to rinse the dish in which the mixture was evaporated, and adding the rinsings to the flask.

The weight of the residue is the amount of total alkaloids from 4 mils of Fluidextract of Cinchona.

Average dose—Metric, 1 mil—Apothecaries, 15 minims.

FLUIDEXTRACTUM COLCHICI SEMINIS

Fluidextract of Colchicum Seed

Fldext. Colch. Sem.—Fluid Extract of Colchicum Seed

One hundred mils of Fluidextract of Colchicum Seed yields not less than 0.36 Gm. nor more than 0.44 Gm. of colchicine.

Colchicum Seed, in No. 40 powder, *one thousand grammes* 1000 Gm.
Purified Petroleum Benzin, *a sufficient quantity.*

Pack the colchicum seed in a cylindrical percolator and slowly percolate with purified petroleum benzin until a few drops of the percolate leave no greasy stain when evaporated on a piece of filter paper. Reject the benzin solution, remove the powder from the percolator and dry it by exposure to the air. Then proceed to make the Fluidextract by Type Process A (see page 174), using a mixture of *two volumes* of alcohol and *one volume* of water as the menstruum.

After dissolving the soft extract in the reserve liquid, assay a portion as directed below, and, from the result thus obtained, ascertain by calculation the amount of alkaloids in the remainder of the liquid, and dilute this with enough menstruum to make each *one hundred mils* of the finished Fluidextract contain 0.4 Gm. of colchicine.

Assay—Introduce 15 mils of Fluidextract of Colchicum Seed into a 500 mil flask, add 10 mils of solution of lead subacetate, previously diluted with 35 mils of distilled water, shake the mixture thoroughly, then add 240 mils of distilled water, again agitate the mixture and proceed as directed under *Colchici Semen*, page 120, fifth line of the Assay.

AVERAGE DOSE—Metric, 0.2 mil—Apothecaries, 3 minims.

FLUIDEXTRACTUM DIGITALIS

Fluidextract of Digitalis

Fldext. Digital.—Fluid Extract of Digitalis

If assayed biologically the minimum lethal dose should not be greater than 0.0006 mil of the Fluidextract, or the equivalent in Fluidextract of 0.0000005 Gm. of ouabain, for each gramme of body weight of frog.

DIGITALIS, in No. 30 powder, *one thousand grammes*	1000 Gm.

Prepare a Fluidextract by Type Process A (see page 174), using a mixture of *five volumes* of alcohol and *one volume* of water as the menstruum.

Assay—For a method of assaying Fluidextract of Digitalis see Biological Assays (Part II).

AVERAGE DOSE—Metric, 0.05 mil—Apothecaries, 1 minim.

FLUIDEXTRACTUM ERGOTÆ

Fluidextract of Ergot

Fldext. Ergot.—Fluid Extract of Ergot Secalis cornuti extractum fluidum P.I.

ERGOT, recently ground and in No. 40 powder, *one thousand grammes*	1000 Gm.

Prepare a Fluidextract by Type Process B (see page 175), using a mixture of *twenty mils* of hydrochloric acid and *nine hundred and eighty mils* of diluted alcohol as Menstruum I, and diluted alcohol as Menstruum II.

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

FLUIDEXTRACTUM ERIODICTYI

Fluidextract of Eriodictyon

Fldext. Eriodict.—Fluid Extract of Eriodictyon Fluidextract of Yerba Santa

Eriodictyon, in No. 30 powder, *one thousand grammes*.... 1000 Gm.

Prepare a Fluidextract by Type Process A (see page 174), using a mixture of *four volumes* of alcohol and *one volume* of water as the menstruum, and reserving the first *eight hundred mils* of percolate.

Average dose—Metric, 1 mil—Apothecaries, 15 minims.

FLUIDEXTRACTUM EUCALYPTI

Fluidextract of Eucalyptus

Fldext. Eucalypt.—Fluid Extract of Eucalyptus

Eucalyptus, in No. 30 powder, *one thousand grammes*.... 1000 Gm.

Prepare a Fluidextract by Type Process A (see page 174), using a mixture of *three volumes* of alcohol and *one volume* of water as the menstruum, and reserving the first *eight hundred mils* of percolate.

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

FLUIDEXTRACTUM FRANGULÆ

Fluidextract of Frangula

Fldext. Frangul.—Fluid Extract of Frangula Fluidextract of Buckthorn Bark

Frangula, in No. 30 powder, *one thousand grammes*......	1000 Gm.
Alcohol, *two hundred and fifty milliliters*................	250 mils

Prepare a Fluidextract by Type Process D (see page 176). Evaporate the aqueous percolate to *seven hundred and fifty mils* and, when cold, add the alcohol and, if necessary, sufficient water to make the product measure *one thousand mils*.

Average dose—Metric, 1 mil—Apothecaries, 15 minims.

FLUIDEXTRACTUM GELSEMII

Fluidextract of Gelsemium

Fldext. Gelsem.—Fluid Extract of Gelsemium

Gelsemium, in No. 40 powder, *one thousand grammes* ..... 1000 Gm.

Prepare a Fluidextract by Type Process A (see page 174), using a mixture of *four volumes* of alcohol and *one volume* of water as the menstruum.

Average dose—Metric, 0.03 mil—Apothecaries, ½ minim.

FLUIDEXTRACTUM GENTIANÆ

Fluidextract of Gentian

Fldext. Gentian.—Fluid Extract of Gentian

Gentian, in No. 30 powder, *one thousand grammes* .... 1000 Gm.

Prepare a Fluidextract by Type Process A (see page 174), using diluted alcohol as the menstruum.

Average dose—Metric, 1 mil—Apothecaries, 15 minims.

FLUIDEXTRACTUM GLYCYRRHIZÆ

Fluidextract of Glycyrrhiza

Fldext. Glycyrrh.—Fluid Extract of Glycyrrhiza Fluidextract of Licorice

Glycyrrhiza, in No. 20 powder, *one thousand grammes* ...	1000 Gm.
Alcohol, *two hundred and fifty milliliters*	250 mils
Ammonia Water,	
Chloroform Water,	
Water, each, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Mix *three hundred mils* of ammonia water with *twenty-seven hundred mils* of chloroform water and moisten the glycyrrhiza with a sufficient quantity of the mixture; pack it in a cylindrical percolator and add enough of the menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed slowly, gradually adding more of the same menstruum until the glycyrrhiza is exhausted. Reserve the first *five hundred mils* of the percolate and evaporate the remainder on a water bath to a soft extract; dissolve this in the reserve portion and add enough water to make the product measure *seven hundred and fifty mils.* A few drops of ammonia water may be added if necessary to facilitate solution. Now gradually add the alcohol, allow the product to stand for seven days in a stoppered container, then decant the clear liquid, filter the remainder and wash the residue on the filter with enough of a mixture of *one volume* of alcohol and *three volumes* of water to make the Fluidextract measure *one thousand mils.*

Preparation—Elixir Glycyrrhizæ.

AVERAGE DOSE—Metric, 2 mils—Apothecaries, 30 minims.

FLUIDEXTRACTUM GRANATI

Fluidextract of Pomegranate

Fldext. Granat.—Fluid Extract of Pomegranate

POMEGRANATE, in No. 30 powder, *one thousand grammes* . . 1000 Gm.

Prepare a Fluidextract by Type Process B (see page 175), using a mixture of *one hundred mils* of glycerin, *five hundred mils* of alcohol and *four hundred mils* of water as Menstruum I, and diluted alcohol as Menstruum II.

AVERAGE DOSE—Metric, 2 mils—Apothecaries, 30 minims.

FLUIDEXTRACTUM GRINDELIÆ

Fluidextract of Grindelia

Fldext. Grindel.—Fluid Extract of Grindelia

GRINDELIA, in No. 30 powder, *one thousand grammes* . . . . . 1000 Gm.

Prepare a Fluidextract by Type Process A (see page 174), using a mixture of *three volumes* of alcohol and *one volume* of water as the menstruum.

AVERAGE DOSE—Metric, 2 mils—Apothecaries, 30 minims.

FLUIDEXTRACTUM GUARANÆ

Fluidextract of Guarana

Fldext. Guaran.—Fluid Extract of Guarana

One hundred mils of Fluidextract of Guarana yields not less than 3.6 Gm. nor more than 4.4 Gm. of caffeine.

GUARANA, in No. 60 powder, *one thousand grammes* . . . . . 1000 Gm.

Prepare a Fluidextract by Type Process A (see page 174), using a mixture of *three volumes* of alcohol and *one volume* of water as the menstruum, and reserving the first *eight hundred mils* of percolate.

After dissolving the soft extract in the reserve liquid, assay a portion as directed below, and, from the result thus obtained, ascertain by calculation the amount of alkaloid in the remainder of the liquid and dilute this with enough menstruum to make each *one hundred mils* of the finished Fluidextract contain 4 Gm. of caffeine.

> **Assay**—Introduce 5 mils of Fluidextract of Guarana into a separator, add 1 mil of ammonia water, and shake out the alkaloid with chloroform until completely extracted, as shown by testing with iodine T.S. Evaporate the combined chloroform solutions to dryness and dissolve the residue in 20 mils of distilled water with the aid of heat. Allow this to cool, filter it into a separator and wash the container and filter with several small portions of distilled water, adding the rinsings to the liquid in the separator. Then shake out the alkaloid with chloroform until completely extracted, as shown by testing with iodine T.S., evaporate the combined chloroform solutions and dry the residue to constant weight at 80° C. The weight represents the alkaloid in 5 mils of Fluidextract of Guarana (see Proximate Assays, Part II).

AVERAGE DOSE—Metric, 2 mils—Apothecaries, 30 minims.

FLUIDEXTRACTUM HYDRASTIS

Fluidextract of Hydràstis

Fldext. Hydrast.—Fluid Extract of Hydrastis Fluidextract of Golden Seal

One hundred mils of Fluidextract of Hydrastis yields not less than 1.8 Gm. nor more than 2.2 Gm. of the ether-soluble alkaloids of hydrastis.

HYDRASTIS, in No. 40 powder, *one thousand grammes* . . . . . 1000 Gm.

Prepare a Fluidextract by Type Process B (see page 175), using a mixture of *one hundred mils* of glycerin, *six hundred mils* of alcohol and *two hundred mils* of water as Menstruum I, and a mixture of *two volumes* of alcohol and *one volume* of water as Menstruum II. Reserve the first *seven hundred and fifty mils* of percolate.

After dissolving the soft extract in the reserve liquid, assay a portion as directed below, and, from the result thus obtained, ascertain by calculation the amount of alkaloids in the remainder of the liquid and dilute this with enough of Menstruum II to make each *one hundred mils* of the finished Fluidextract contain 2 Gm. of the ether-soluble alkaloids of hydrastis.

> **Assay**—Proceed as directed under *Fluidextractum Belladonnæ Radicis*, page 178, modifying the process there given by using 5 mils of Fluidextract of Hydrastis instead of 10 mils of the fluidextract of belladonna root and using only ether

as the immiscible solvent throughout the assay. Dry the residue to constant weight at 100° C., instead of titrating it. The weight represents the amount of ether-soluble alkaloids in 5 mils of the Fluidextract of Hydrastis.

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

FLUIDEXTRACTUM HYOSCYAMI

Fluidextract of Hyoscyamus

Fldext. Hyosc.—Fluid Extract of Hyoscyamus Fluidextract of Henbane

One hundred mils of Fluidextract of Hyoscyamus yields not less than 0.055 Gm. nor more than 0.075 Gm. of the alkaloids of hyoscyamus.

Hyoscyamus, in No. 40 powder, *one thousand grammes*.... 1000 Gm.

Prepare a Fluidextract by Type Process A (see page 174), using a mixture of *three volumes* of alcohol and *one volume* of water as the menstruum.

After dissolving the soft extract in the reserve liquid, assay a portion as directed below, and, from the result thus obtained, ascertain by calculation the amount of alkaloids in the remainder of the liquid and dilute this with enough menstruum to make each *one hundred mils* of the finished Fluidextract contain 0.065 Gm. of the alkaloids of hyoscyamus.

Assay—Proceed as directed under *Fluidextractum Belladonnæ Radicis*, page 178, second line of the Assay, modifying the process there given by using 25 mils of the Fluidextract of Hyoscyamus in place of 10 mils of fluidextract of belladonna root, and before titrating treating the residue twice with 5 mils of ether and evaporating to dryness each time.

Each mil of tenth-normal sulphuric acid V.S. consumed corresponds to 28.92 milligrammes of the total alkaloids of hyoscyamus.

Average dose—Metric, 0.2 mil—Apothecaries, 3 minims.

FLUIDEXTRACTUM IPECACUANHÆ

Fluidextract of Ipecac

Fldext. Ipecac.—Fluid Extract of Ipecac

One hundred mils of Fluidextract of Ipecac yields not less than 1.8 Gm. nor more than 2.2 Gm. of the ether-soluble alkaloids of ipecac.

Ipecac, in No. 60 powder, *one thousand grammes*......... 1000 Gm.

Prepare a Fluidextract by Type Process B (see page 175), using a mixture of *one hundred mils* of diluted hydrochloric acid, *two hundred mils* of alcohol and *two hundred mils* of water as Menstruum I, and a mixture of *two volumes* of alcohol and *three volumes* of water as Menstruum II. Reserve the first *eight hundred mils* of percolate.

After dissolving the soft extract in the reserve liquid, assay a portion as directed below, and, from the result thus obtained, ascertain by calculation the amount of alkaloids in the remainder of the liquid and dilute this with enough of Menstruum II to make each *one hundred mils* of the finished Fluidextract contain 2 Gm. of the ether-soluble alkaloids of ipecac.

Assay—From a pipette drop 10 mils of Fluidextract of Ipecac evenly over the surface of 10 Gm. of purified sawdust (see page 546), and evaporate it to dryness at a temperature not exceeding 80° C. Transfer the impregnated sawdust to a 250 mil flask and add 100 mils of ether. Rinse the dish in which the mixture was evaporated with 6 mils of ammonia water, previously diluted with an equal volume of water, used in several portions, and add the rinsings to the flask. Stopper the flask and shake it vigorously every few minutes, during two hours. Now add 15 mils of distilled water, again shake the flask well, and when the sawdust has subsided decant 50 mils of the ether solution, representing 5 mils of the Fluidextract. Completely extract the alkaloids from this solution by shaking out with weak sulphuric acid. Collect the acid washings in a separator; add ammonia water until the solution is decidedly alkaline to litmus, and completely extract the alkaloids by shaking out repeatedly with ether. Evaporate the combined ether washings to dryness, dissolve the alkaloid from the residue in exactly 10 mils of tenth-normal sulphuric acid V.S. and titrate the excess of acid with fiftieth-normal potassium hydroxide V.S., cochineal T.S. being used as indicator (see Proximate Assays, Part II).

Each mil of tenth-normal sulphuric acid V.S. consumed corresponds to 24 milligrammes of the ether-soluble alkaloids of ipecac.

Preparation—Syrupus Ipecacuanhæ.

Average dose—Expectorant, Metric, 0.05 mil—Apothecaries, 1 minim.

FLUIDEXTRACTUM LOBELIÆ

Fluidextract of Lobelia

Fldext. Lobel.—Fluid Extract of Lobelia

Lobelia, in No. 30 powder, *one thousand grammes* ...... 1000 Gm.

Prepare a Fluidextract by Type Process B (see page 175), using a mixture of *fifty mils* of acetic acid, *five hundred mils* of alcohol and *four hundred and fifty mils* of water as Menstruum I, and diluted alcohol as Menstruum II.

Average dose—Metric, 0.15 mil—Apothecaries, 2½ minims.

FLUIDEXTRACTUM NUCIS VOMICÆ

Fluidextract of Nux Vomica

Fldext. Nuc. Vom.—Fluid Extract of Nux Vomica

One hundred mils of Fluidextract of Nux Vomica yields not less than 2.37 Gm. nor more than 2.63 Gm. of the alkaloids of nux vomica.

Nux Vomica, in No. 40 powder, *one thousand grammes* . . . 1000 Gm.

Prepare a Fluidextract by Type Process A (see page 174), using a mixture of *three volumes* of alcohol and *one volume* of water as the menstruum, and reserving the first *eight hundred mils* of percolate.

After dissolving the soft extract in the reserve liquid, assay a portion as directed below, and, from the result thus obtained, ascertain by calculation the amount of alkaloids in the remainder of the liquid and dilute this with enough menstruum to make each *one hundred mils* of the finished Fluidextract contain 2.5 Gm. of the alkaloids of nux vomica.

Assay—Proceed as directed under *Fluidextractum Belladonnæ Radicis*, page 178, using 10 mils of Fluidextract of Nux Vomica, modifying the process there given by dissolving the alkaloidal residue in 10 mils of tenth-normal sulphuric acid V.S. instead of 5 mils.

Each mil of tenth-normal sulphuric acid V.S. consumed corresponds to 36.42 milligrammes of the alkaloids of nux vomica.

Average dose—Metric, 0.05 mil—Apothecaries, 1 minim.

FLUIDEXTRACTUM PILOCARPI

Fluidextract of Pilocarpus

Fldext. Pilocarp.—Fluid Extract of Pilocarpus Fluidextract of Jaborandi

One hundred mils of Fluidextract of Pilocarpus yields not less than 0.55 Gm. nor more than 0.65 Gm. of the alkaloids of pilocarpus.

Pilocarpus, in No. 30 powder, *one thousand grammes* . . . . 1000 Gm.

Prepare a Fluidextract by Type Process A (see page 174), using a mixture of *two volumes* of alcohol and *one volume* of water as the menstruum, and reserving the first *eight hundred mils* of percolate.

After dissolving the soft extract in the reserve liquid, assay a portion as directed below, and from the result thus obtained, ascertain by calculation the amount of alkaloids in the remainder of the liquid and dilute this with enough menstruum to make each *one hundred mils* of the finished Fluidextract contain 0.6 Gm. of the alkaloids of pilocarpus.

Assay—From a pipette drop 15 mils of Fluidextract of Pilocarpus evenly over the surface of 15 Gm. of purified sawdust (see page 546), and evaporate it to dryness on a water bath. Transfer the mixture to a 250 mil flask, add 150 mils of chloroform, and proceed as directed under *Belladonnæ Radix*, page 73, third line of the Assay, beginning with the word "Stopper," modifying the process there given by increasing the amount of ammonia water to 6 mils, mixed with 5 mils of distilled water, which is to be used, in divided portions, to rinse the dish in which the mixture was evaporated, the rinsings being added to the mixture in the flask; the 100 mils of chloroform solution must be drawn off from the bottom of the flask.

Each mil of tenth-normal sulphuric acid V.S. corresponds to 20.815 milligrammes of the alkaloids of pilocarpus.

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

FLUIDEXTRACTUM PODOPHYLLI

Fluidextract of Podophyllum

Fldext. Podophyll.—Fluid Extract of Podophyllum

Podophyllum, in No. 40 powder, *one thousand grammes*... 1000 Gm.

Prepare a Fluidextract by Type Process A (see page 174), using alcohol as the menstruum.

Average dose—Metric, 0.5 mil—Apothecaries, 8 minims.

FLUIDEXTRACTUM RHEI

Fluidextract of Rhubarb

Fldext. Rhei—Fluid Extract of Rhubarb

Rhubarb, in No. 30 powder, *one thousand grammes*....... 1000 Gm.

Prepare a Fluidextract by Type Process A (see page 174), using a mixture of *four volumes* of alcohol and *one volume* of water as the menstruum.

Preparation—Syrupus Rhei.

Average dose—Metric, 1 mil—Apothecaries, 15 minims.

FLUIDEXTRACTUM ROSÆ

Fluidextract of Rose

Fldext. Rosæ—Fluid Extract of Rose

Red Rose, in No. 20 powder, *one thousand grammes*...... 1000 Gm.

Prepare a Fluidextract by Type Process B (see page 175), using a mixture of *one hundred mils* of glycerin, *five hundred mils* of alcohol and *four hundred mils* of water as Menstruum I, and diluted alcohol as Menstruum II.

Preparation—Mel Rosæ.

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

FLUIDEXTRACTUM SABAL

Fluidextract of Sabal

Fldext. Sabal—Fluid Extract of Sabal Fluidextract of Saw Palmetto

Sabal, in No. 20 powder, *one thousand grammes*..........	1000 Gm.

Prepare a Fluidextract by Type Process A (see page 174), using a mixture of *four volumes* of alcohol and *one volume* of water as the menstruum.

Average dose—Metric, 1 mil—Apothecaries, 15 minims.

FLUIDEXTRACTUM SARSAPARILLÆ

Fluidextract of Sarsaparilla

Fldext. Sarsap.—Fluid Extract of Sarsaparilla

Sarsaparilla, in No. 20 powder, *one thousand grammes*...	1000 Gm.

Prepare a Fluidextract by Type Process A (see page 174), using diluted alcohol as the menstruum.

Preparation—Syrupus Sarsaparillæ Compositus.

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

FLUIDEXTRACTUM SARSAPARILLÆ COMPOSITUM

Compound Fluidextract of Sarsaparilla

Fldext. Sarsap. Co.—Compound Fluid Extract of Sarsaparilla

Sarsaparilla, in No. 20 powder, *seven hundred and fifty grammes*..	750 Gm.
Glycyrrhiza, in No. 20 powder, *one hundred and twenty grammes*..	120 Gm.
Sassafras, in No. 30 powder, *one hundred grammes*......	100 Gm.
Mezereum, in No. 30 powder, *thirty grammes*............	30 Gm.

Mix the powders and prepare a Fluidextract by Type Process B (see page 175), using a mixture of *one hundred mils* of glycerin, *five hundred mils* of alcohol and *four hundred mils* of water as Menstruum I, and diluted alcohol as Menstruum II.

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

FLUIDEXTRACTUM SCILLÆ

Fluidextract of Squill

Fldext. Scill.—Fluid Extract of Squill

If assayed biologically the minimum lethal dose should not be greater than 0.0006 mil of Fluidextract, or the equivalent in Fluidextract of 0.0000005 Gm. of ouabain, for each gramme of body weight of frog.

SQUILL, in No. 20 powder, *one thousand grammes*	1000 Gm.
DILUTED ALCOHOL,	
ALCOHOL,	
WATER, each, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Mix *two thousand mils* of alcohol with *one thousand mils* of water, moisten the squill thoroughly with sufficient of the mixture and allow it to macerate for two hours in a tightly-covered container. Then transfer it to a percolator, shake it down evenly without packing, and pour on enough of the menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed slowly, gradually adding more menstruum composed of *two volumes* of alcohol and *one volume* of water. When the percolate measures *one thousand mils*, close the lower orifice and macerate the drug twelve hours before continuing the percolation. Then collect a second *one thousand mils* of percolate, again interrupt the percolation, macerate for twelve hours and then continue the percolation until the total percolate measures *five thousand mils*. Recover the alcohol from the percolate at as low a temperature as possible and then concentrate the residue to a volume measuring *eight hundred mils*. When the residue is cold, add slowly, with continuous agitation, *two thousand mils* of alcohol and set the mixture aside in a tightly-stoppered container for twelve hours. Decant the supernatant liquid from the syrupy layer, filter the decanted liquid and wash the syrupy residue with two portions of *three hundred mils* each of a mixture of *four volumes* of alcohol and *one volume* of water, passing the washings through the filter into the previously collected alcoholic liquid. Reduce the combined alcoholic liquids to *eight hundred mils* by distillation and finally add enough diluted alcohol to make the finished Fluidextract measure *one thousand mils.*

Assay—For a method of assaying Fluidextract of Squill see Biological Assays (Part II).

Preparation—Syrupus Scillæ Compositus.

AVERAGE DOSE—Metric, 0.1 mil—Apothecaries, 1½ minims.

FLUIDEXTRACTUM SENEGÆ

Fluidextract of Senega

Fldext. Seneg.—Fluid Extract of Senega

SENEGA, in No. 30 powder, *one thousand grammes*	1000 Gm.
AMMONIA WATER,	
ALCOHOL,	
WATER, each, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Mix *two thousand mils* of alcohol with *one thousand mils* of water, and, having moistened the powder with sufficient of this mixture, pack it in a cylindrical percolator and add enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed slowly, gradually adding menstruum, composed of a mixture of *two volumes* of alcohol and *one volume* of water, until the drug is exhausted. Reserve the first *eight hundred mils* of the percolate and evaporate the remainder to a soft extract; dissolve this in the reserved liquid and then gradually add ammonia water until the product is faintly alkaline and possesses a slight odor of ammonia. Finally add enough of the menstruum to make the Fluidextract measure *one thousand mils.*

Preparations—Syrupus Scillæ Compositus Syrupus Senegæ.

AVERAGE DOSE—Metric, 1 mil—Apothecaries, 15 minims.

FLUIDEXTRACTUM SENNÆ

Fluidextract of Senna

Fldext. Senn.—Fluid Extract of Senna

ALEXANDRIA SENNA, in No. 40 powder, *one thousand grammes*	1000 Gm.

Prepare a Fluidextract by Type Process A (see page 174), using a mixture of *one volume* of alcohol and *two volumes* of water as the menstruum, and reserving the first *eight hundred mils* of percolate.

Preparations—Syrupus Sarsaparillæ Compositus Syrupus Sennæ.

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

FLUIDEXTRACTUM SPIGELIÆ

Fluidextract of Spigelia

Fldext. Spigel.—Fluid Extract of Spigelia Fluidextract of Pink Root

Spigelia, in No. 40 powder, *one thousand grammes* .... 1000 Gm.

Prepare a Fluidextract by Type Process A (see page 174), using diluted alcohol as the menstruum.

Average dose—Metric, 5 mils—Apothecaries, 1 fluidrachm.

FLUIDEXTRACTUM STAPHISAGRIÆ

Fluidextract of Staphisagria

Fldext. Staphisag.—Fluid Extract of Staphisagria Fluidextract of Stavesacre

Staphisagria, in No. 20 powder, *one thousand grammes*... 1000 Gm.

Prepare a Fluidextract by Type Process A (see page 174), using alcohol as the menstruum.

The oil which separates in the freshly prepared Fluidextract may be removed by chilling and filtering the cold Fluidextract through a filter moistened with alcohol.

FLUIDEXTRACTUM STILLINGIÆ

Fluidextract of Stillingia

Fldext. Stilling.—Fluid Extract of Stillingia

Stillingia, in No. 30 powder, *one thousand grammes* ..... 1000 Gm.

Prepare a Fluidextract by Type Process A (see page 174), using diluted alcohol as the menstruum.

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

FLUIDEXTRACTUM SUMBUL

Fluidextract of Sumbul

Fldext. Sumbul—Fluid Extract of Sumbul Fluidextract of Musk Root

Sumbul, in No. 30 powder, *one thousand grammes*	1000 Gm.

Prepare a Fluidextract by Type Process A (see page 174), using a mixture of *four volumes* of alcohol and *one volume* of water as the menstruum.

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

FLUIDEXTRACTUM TARAXACI

Fluidextract of Taraxacum

Fldext. Tarax.—Fluid Extract of Taraxacum Fluidextract of Dandelion

Taraxacum, in No. 30 powder, *one thousand grammes*	1000 Gm.

Prepare a Fluidextract by Type Process B (see page 175), using a mixture of *one hundred mils* of glycerin, *five hundred mils* of alcohol and *four hundred mils* of water as Menstruum I, and diluted alcohol as Menstruum II.

Average dose—Metric, 10 mils—Apothecaries, 2½ fluidrachms.

FLUIDEXTRACTUM TRITICI

Fluidextract of Triticum

Fldext. Tritic.—Fluid Extract of Triticum Fluidextract of Couch Grass

Triticum, finely cut, *one thousand grammes*	1000 Gm.
Alcohol, *two hundred milliliters*	200 mils

Prepare a Fluidextract by Type Process D (see page 176), evaporate the aqueous percolate to *eight hundred mils* and when cold add the alcohol and, if necessary, sufficient water to make the product measure *one thousand mils.*

Average dose—Metric, 10 mils—Apothecaries, 2½ fluidrachms.

FLUIDEXTRACTUM UVÆ URSI

Fluidextract of Uva Ursi

Fldext. Uvæ Ursi—Fluid Extract of Uva Ursi

Uva Ursi, in No. 30 powder, *one thousand grammes*	1000 Gm.

Prepare a Fluidextract by Type Process B (see page 175), using a mixture of *one hundred mils* of glycerin, *three hundred mils* of alcohol and *five hundred mils* of water as Menstruum I, and a mixture of *one volume* of alcohol and *two volumes* of water as Menstruum II. Reserve the first *eight hundred mils* of percolate.

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

FLUIDEXTRACTUM VERATRI VIRIDIS

Fluidextract of Veratrum Viride

Fldext. Verat. Vir.—Fluid Extract of Veratrum Viride Fluidextract of Green Hellebore

Veratrum Viride, in No. 40 powder, *one thousand grammes* 1000 Gm.

Prepare a Fluidextract by Type Process A (see page 174), using alcohol as the menstruum.

Average dose—Metric, 0.1 mil—Apothecaries, 1½ minims.

FLUIDEXTRACTUM VIBURNI PRUNIFOLII

Fluidextract of Viburnum Prunifolium

Fldext. Viburn. Prun.—Fluid Extract of Viburnum Prunifolium Fluidextract of Black Haw

Viburnum Prunifolium, in No. 30 powder, *one thousand grammes* .... 1000 Gm.

Prepare a Fluidextract by Type Process A (see page 174), using a mixture of *two volumes* of alcohol and *one volume* of water as the menstruum.

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

FLUIDEXTRACTUM XANTHOXYLI

Fluidextract of Xanthoxylum

Fldext. Xanthox.—Fluid Extract of Xanthoxylum Fluidextract of Prickly Ash

Xanthoxylum, in No. 30 powder, *one thousand grammes*.. 1000 Gm.

Prepare a Fluidextract by Type Process A (see page 174), using a mixture of *three volumes* of alcohol and *one volume* of water as the menstruum.

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

FLUIDEXTRACTUM ZINGIBERIS

Fluidextract of Ginger

Fldext. Zingib.—Fluid Extract of Ginger

Jamaica Ginger, in No. 40 powder, *one thousand grammes*. 1000 Gm.

Prepare a Fluidextract by Type Process A (see page 174), using alcohol as the menstruum.

Preparation—Syrupus Zingiberis.

Average dose—Metric, 1 mil—Apothecaries, 15 minims.

FŒNICULUM

Fennel

Fœnic.—Fennel Seed

The dried, ripe fruit of cultivated varieties of *Fœniculum vulgare* Miller (Fam. *Umbelliferæ*), without the presence or admixture of more than 4 per cent. of foreign matter.

Mericarps usually separate, each being broadly elliptical, more or less curved, from 4 to 10 mm. in length and from 1 to 3.5 mm. in breadth, some having a slender stalk from 2 to 10 mm. in length; dorsal surface convex, yellowish-green to grayish-brown, with three prominent, longitudinal primary ribs and at the summit a short, conical stylopodium; commissural surface with three narrow, light brown, longitudinal areas separated by two dark brown or brownish-black areas containing the vittæ or oil-tubes; odor and taste aromatic and characteristic.

Under the microscope, transverse sections of Fennel show a pentagonal mericarp, four of the edges being nearly equal and slightly concave, the other or commissural surface being much longer and more or less undulate; cells of the seed-coat closely united with those of the pericarp, giving the section two very distinct areas, the inner and larger portion (endosperm) more or less rounded-pentagonal and somewhat reniform, composed of polygonal cells, filled with aleurone grains containing rosette aggregates of calcium oxalate and a thin protoplasmic layer enclosing a fixed oil; the outer or pericarp layer distinguished by large elliptical vittæ with thick, brown walls, occurring singly and alternating with the primary ribs, and two vittæ on the dorsal surface, making usually six vittæ in all, there sometimes being, however, one or two vittæ additional; in the central portion of each of the ribs occurs a nearly circular, fibro-vascular bundle with a few tracheæ and numerous thin-walled, strongly lignified sclerenchymatous fibers.

The powder is yellowish-brown consisting of irregular angular fragments; tissues of endosperm, colorless, the cells filled with aleurone grains, each containing a rosette aggregate of calcium oxalate, about 0.002 mm. in diameter; fragments containing yellowish-brown vittæ, from 0.1 to 0.2 mm. in width; sclerenchymatous fibers few, strongly lignified and with numerous, oblique, simple pores; parenchyma cells with more or less thick walls and simple pores and occasionally reticulately thickened; tracheæ few and either spiral or annular; in mounts made with hydrated chloral T.S., numerous globules of a fixed oil separate.

Fennel yields not more than 9 per cent. of ash.

Preparation—Infusum Sennæ Compositum.

Average dose—Metric, 1 Gm.—Apothecaries, 15 grains.

FRANGULA

Frangula

Frang.—Buckthorn Bark

The dried bark of *Rhamnus Frangula* Linné (Fam. *Rhamnaceæ*).

In quills varying in length, frequently flattened or crushed; from 0.5 to 1 mm. in thickness; outer surface grayish-brown or purplish-black, with numerous, prominent, lighter-colored, transverse lenticels and occasional patches of foliaceous lichens bearing small, blackish apothecia; inner surface smooth, dark brown with occasional purplish blotches, longitudinally striate, becoming red when moistened with solutions of the alkalies; fracture short, slightly fibrous in the inner layer; odor distinctive; taste slightly bitter.

Under the microscope, transverse sections of Frangula show a distinctly undulate corky layer, composed of about 12 rows of reddish-brown cells; parenchyma cells of the primary cortex with numerous rosette aggregates of calcium oxalate, from 0.01 to 0.025 mm. in diameter; inner bark with bast-fibers in narrow, interrupted rows, the groups of fibers being separated radially by the medullary rays; bast-fibers with thick, strongly lignified, yellowish walls and narrow lumina and each group surrounded by a layer of crystal fibers, the prismatic crystals of calcium oxalate varying from 0.007 to 0.015 mm. in diameter, medullary rays one to two cells in width, occasionally three; cells of the parenchyma and medullary rays with numerous starch grains, 0.003 mm. in diameter.

The powder is yellowish-brown; stone cells absent (distinguishing it from the powder of *Cascara Sagrada*).

Add 0.1 Gm. of powdered Frangula to 10 mils of hot distilled water, shake the mixture occasionally until cold and filter; on the addition of a few drops of ammonia water, the filtrate is colored a deep red.

Macerate 0.1 Gm. of powdered Frangula with 10 drops of alcohol, boil with 10 mils of distilled water and filter when cold. Shake this filtrate with 10 mils of ether; a yellow, ethereal solution separates, and 3 mils of this ethereal solution, when shaken with 3 mils of ammonia water, yields an alkaline solution, which, on being diluted with 20 mils of distilled water, still possesses a distinct cherry-red color.

Frangula yields not more than 6 per cent. of ash.

Preparation—Fluidextractum Frangulæ.

Average dose—Metric, 1 Gm.—Apothecaries, 15 grains.

GALLA

Nutgall

Gall.—Aleppo Galls Smyrna Galls

Excrescences on the young twigs of *Quercus infectoria* Olivier and other allied species of *Quercus* (Fam. *Fagaceæ*), induced by the punctures on the leaf-buds and by the deposited ova of *Cynips tinctoria* Hartig (Order *Hymenoptera*). Not more than 5 per cent. of Galls float in water.

Nearly globular, from 0.8 to 2.2 cm. in diameter; externally blackish-olive-green or blackish-gray, more or less tuberculated on the upper portion, the basal portion being nearly smooth and contracted into a short stalk; heavy, sinking in water, excepting the smaller galls; fracture short-horny; internally grayish or dark brown, consisting of a central portion slightly radiating and resinous, occasionally hollow and traversed by a narrow radial canal extending to the exterior as shown by the perforation in the whole gall; odor slight; taste strongly astringent.

The powder consists of numerous fragments of thick-walled starch-bearing parenchyma; starch grains numerous; more or less free in the powder and varying in shape from spherical or ellipsoidal to polygonal, and from 0.005 to 0.03 mm. in diameter; stone-cells few, resembling those found in fruits and seeds, varying considerably in shape and size, and from 0.025 to 0.3 mm. in length; occasional fragments with spiral or reticulate tracheæ; fragments mounted in dilute ferric chloride T.S. assume a deep blue or greenish-blue color.

Macerate 0.5 Gm. of the powdered Nutgall with 2 mils of alcohol for a few minutes, add 500 mils of water, stir the mixture well for five minutes and filter. Take 1 mil of the light yellowish-brown solution, and dilute it with 10 mils of water; it shows a distinct blue or violet-blue color upon the addition of a drop of ferric chloride T.S.

Preparation—Unguentum Gallæ.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

GAMBIR

Gambir

Pale Catechu

A dried extract prepared from decoctions of the leaves and twigs of *Ourouparia Gambir* (Hunter) Baillon (Fam. *Rubiaceæ*).

Usually in cubical or rectangular pieces from 20 to 30 mm. in diameter; externally pale grayish-brown to reddish-brown, more or less dull and porous; friable; internally of a light brown or dull earthy color; inodorous; taste bitterish and very astringent.

Upon scraping a piece of Gambir and mounting the separated fragments in hydrated chloral T.S. and examining them under the microscope, numerous acicular crystals, from 0.01 to 0.03 mm. in length, separate at the edges of the fragments and gradually dissolve, leaving a few, thick-walled, non-glandular hairs which, when entire, may be 0.35 mm. in length; a few fragments of leaves may also be present showing either epidermal cells or small narrow tracheæ with spiral or annular markings; a few starch grains either single or compound, of variable shapes and from 0.005 to 0.015 mm. in diameter; a number of bacteria may also be present.

Macerate 1 Gm. of Gambir with 50 mils of water, and filter; the pale yellowish-brown solution obtained gives an intense, green color with dilute ferric chloride T.S.; but yields no precipitate with copper sulphate T.S.

Not less than 65 per cent. of Gambir is soluble in water and not less than 60 per cent. is soluble in alcohol.

Gambir yields not more than 9 per cent. of ash.

Preparation—Tinctura Gambir Composita.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

GELATINUM

Gelatin

Gelat.

The purified product obtained from animal tissues, as skin, ligaments, and bones, by treatment with boiling water.

An amorphous solid, in sheets or flakes or in ground, powdered or shredded form, colorless or slightly yellowish, and having a very slight, characteristic odor and taste; unalterable in the air when dry, but decomposing when moist or in solution.

Gelatin is insoluble in cold water but swells and softens when immersed in it, gradually absorbing from 5 to 10 times its own weight of water; soluble in hot water, acetic acid or glycerin; insoluble in alcohol, chloroform, ether, benzene, carbon disulphide or fixed or volatile oils.

An aqueous solution of Gelatin (1 in 5000) is at once rendered turbid by the addition of tannic acid T.S.

A hot solution of Gelatin in distilled water (1 in 40) is free from putrid odor, and is not more than slightly acid to litmus; it appears not more than slightly opalescent in a stratum 2 cm. in thickness, and, on cooling to 6° C. and standing for several hours, it forms a firm, transparent or translucent jelly.

Incinerate about 0.5 Gm. of Gelatin; not more than 2 per cent. of ash remains. A solution of the ash in 25 mils of distilled water, made with the aid of heat and a few drops of hydrochloric acid, does not respond to the Test for heavy metals (see Part II, Test No. 3).

Heat 1.5 Gm. of Gelatin with 30 mils of hydrochloric acid (1 in 4) in a 150 mil Erlenmeyer flask on a water bath, and, when the Gelatin has dissolved, add 3 mils of saturated bromine water and heat it on a water bath for fifteen minutes, shaking the flask occasionally. Then add 0.5 Gm. of potassium iodide and follow it immediately with 0.5 mil of a 25 per cent. solution of stannous chloride. Heat the solution for five minutes on a water bath, cool and subject it to the Test for arsenic (see Part II, Test No. 1). The stain produced, if any, is not greater than that produced in a test made with the same quantities of the reagents to which 2 mils of the standard arsenic test solution (see Part II, Test No. 1) has been added.

Dissolve 20 Gm. of Gelatin in 150 mils of hot distilled water in a flask having a round bottom and a long neck, add 5 mils of phosphoric acid and 1 Gm. of sodium bicarbonate, and at once connect the flask with a condenser. Distil 50 mils, receiving the distillate under the surface of 50 mils of tenth-normal iodine V.S. Acidulate the distillate with a few drops of hydrochloric acid, add 2 mils of barium chloride T.S., and heat on a water bath until the liquid is nearly colorless. The precipitate of barium sulphate, if any, when filtered, washed and ignited, weighs not more than 0.0015 Gm., corresponding to not more than 0.002 per cent. of *sulphur dioxide* in the Gelatin, correction being made for any sulphate which may be present in 50 mils of the tenth-normal iodine V.S.

NOTE—Gelatin used for making capsules for medicines contains not more than 0.15 per cent. of sulphur dioxide.

Preparation—Gelatinum Glycerinatum.

GELATINUM GLYCERINATUM

Glycerinated Gelatin

Gelat. Glycerin.

GELATIN, *one hundred grammes*	100 Gm.
GLYCERIN, *one hundred grammes*	100 Gm.
WATER, *a sufficient quantity,*	
To make *two hundred grammes*	200 Gm.

Pour upon the gelatin sufficient water, which has been previously boiled and cooled, to cover it; allow it to stand one hour; pour off the water and allow the gelatin to drain for a few minutes; then transfer it to a dish, add the glycerin, and heat it on a water bath until the gelatin is dissolved. Strain the solution while hot, transfer to a tared dish and continue the heat on the water bath until the product weighs *two hundred grammes.* When cold, cut the mass into pieces, and preserve them in well-closed containers.

GELSEMIUM

Gelsemium

Gelsem.—Yellow Jasmine Root Yellow Jessamine

The dried rhizome and roots of *Gelsemium sempervirens* (Linné) Aiton filius (Fam. *Loganiaceæ*).

Rhizome cylindrical, usually in pieces from 3 to 20 cm. in length and from 3 to 30 mm. in diameter; externally light yellowish-brown, longitudinally wrinkled, with purplish-brown longitudinal lines and transverse fissures; the upper surface with a few stem-scars, the under and side portions with numerous roots and root-scars; fracture tough, splintery; internally light brown or pale yellow, bark thin, wood distinctly radiate, excentral, pith disintegrated; odor slight; taste bitter. Roots light brown; fracture one-half transverse, the other oblique or splintery.

Under the microscope, sections of the rhizome of Gelsemium show a strong development of cork, the walls being grayish or yellowish-brown and more or less lignified; a cortex made up chiefly of parenchyma containing starch and having in the outer portion small scattered groups of stone cells or sclerenchymatous fibers, and in the inner portion in the region of the medullary ray prisms of calcium oxalate; woody portion made up of broad wedges consisting of large tracheæ and fiber-tracheids separated by starch-bearing medullary rays, the innermost cells, or those nearer the pith, being strongly lignified, while the outermost layers, or those nearer the cortex, are non-lignified and may contain prisms of calcium oxalate; an internal phloem or sieve, the cells forming distinct, more or less rounded groups, the latter being partly surrounded by a thin-walled starch-bearing pith.

The powder is dark yellow, tracheæ with bordered pores numerous and conspicuous; spiral tracheæ few; bast-fibers and fiber-tracheids long and narrow, strongly lignified; starch grains spherical, from 0.004 to 0.008 mm. in diameter; calcium oxalate in monoclinic prisms from 0.015 to 0.03 mm. in length; occasional groups of stone cells or sclerenchymatous fibers, the walls being very thick, porous, and strongly lignified.

Preparations—Extractum Gelsemii Fluidextractum Gelsemii Tinctura Gelsemii.

Average dose—Metric, 0.03 Gm.—Apothecaries, ½ grain.

GENTIANA

Gentian

Gentian.—Yellow Gentian Root

The dried rhizome and roots of *Gentiana lutea* Linné (Fam. *Gentianaceæ*).

In nearly cylindrical, sometimes branching pieces, of variable length, from 5 to 35 mm. in thickness; externally yellowish-brown, the rhizome portion annulate, the roots longitudinally wrinkled; fracture short and uneven when dry, but tough and flexible when damp; internally yellowish-brown, the bark from 0.5 to 2 mm. in thickness, separated from the somewhat spongy woody portion by a dark brown cambium zone; odor strong, characteristic; taste slightly sweetish, then strongly and persistently bitter.

The powder is light brown or yellowish-brown, consisting chiefly of parenchymatous cells with fragments of scalariform or reticulate tracheæ; starch grains few or none. Stone cells and sclerenchymatous fibers are absent.

Gentian yields not more than 6 per cent. of ash.

Preparations—Extractum Gentianæ Fluidextractum Gentianæ Tinctura Gentianæ Composita.

Average dose—Metric, 1 Gm.—Apothecaries, 15 grains.

GLUCOSUM

Glucose

Glucos.—Syrupy Glucose Liquid Glucose

A syrupy product obtained by the incomplete hydrolysis of starch, consisting chiefly of dextrose (d-glucose)[$C_6H_{12}O_6 = 180.10$] and dextrins.

Glucose occurs as a colorless or slightly colored, thick, syrupy liquid. It is odorless or nearly so and has a sweet taste.

It is very soluble in water, sparingly soluble in alcohol.

An aqueous solution of Glucose is neutral or slightly acid to litmus.

Add a few drops of an aqueous solution of Glucose (1 in 20) to 5 mils of hot alkaline cupric tartrate T.S.; a copious red precipitate of cuprous oxide is produced (*distinction from cane sugar*).

Introduce about 0.5 Gm. of Glucose into a wide-mouthed, tared weighing-bottle, weigh accurately, add 2 mils of distilled water, evaporate the water at about 70° C. and dry the residue to constant weight at 90° C. The loss in weight of the Glucose does not exceed 21 per cent. (*water*).

Incinerate Glucose at a temperature not exceeding a low red heat; not more than 1 per cent. of ash remains.

A solution of 5 Gm. of Glucose in 15 mils of distilled water, mixed with 5 drops of phenolphthalein T.S., requires not more than 0.6 mil of tenth-normal potassium hydroxide V.S. to produce a pink color (*free acid*).

Dissolve about 2 Gm. of Glucose in 50 mils of distilled water, boil the solution for one minute and cool; the addition of one drop of tenth-normal iodine V.S. to this solution produces no blue color (*starch*). On now adding a few drops of starch T.S. to the solution a blue color is produced (*limit of sulphur dioxide*).

An aqueous solution of Glucose does not respond to the Test for heavy metals (see Part II, Test No. 3). If the solution of Glucose is not colorless, comparison must be made with 10 mils of the same solution, to which a volume of distilled water, equal to that of the hydrogen sulphide T.S., has been added.

Dissolve 1.5 Gm. of Glucose in 5 mils of distilled water; add 5 mils of diluted sulphuric acid and 1 mil of bromine water and heat for five minutes on a water bath. Then add 0.5 Gm. of potassium iodide, follow it with 5 drops of stannous chloride T.S., cool and subject the solution to the Test for arsenic (see Part II, Test No. 1). The stain produced, if any, is not greater than that produced in a test made with the same quantities of the reagents to which 2 mils of the standard arsenic test solution (see Part II, Test No. 1) has been added.

GLYCERINUM

Glycerin

Glycerin.—Glycerol

A liquid obtained by the hydrolysis of vegetable or animal fats, or fixed oils, purified by distillation, and containing not less than 95 per cent. of the trihydric alcohol $C_3H_5(OH)_3$ or $CH_2OH.CHOH.CH_2OH$ (92.06). Preserve it in well-closed containers.

Glycerin is a clear, colorless liquid, of a thick, syrupy consistence, having not more than a slight, characteristic odor which is neither harsh nor disagreeable, sweet to the taste and producing a sensation of warmth in the mouth; when exposed to the air, it absorbs moisture.

Glycerin is miscible with water or alcohol; insoluble in chloroform, ether, benzene, petroleum benzin, carbon disulphide or fixed or volatile oils.

An aqueous solution of Glycerin (1 in 20) is neutral to litmus.

Specific gravity: not below 1.249 at 25° C.

Glycerin does not appreciably volatilize from weak aqueous solutions. When of a strength between 70 and 100 per cent., it rapidly volatilizes at 100° C.

Heat a few drops of Glycerin with about 0.5 Gm. of potassium bisulphate; pungent vapors of acrolein are evolved.

Glycerin is colorless when viewed transversely in a tube of colorless glass about 30 mm. in diameter, held in a vertical position.

Heat 50 Gm. of Glycerin in an open, shallow, 100 mil porcelain or platinum dish until it ignites, then allow it to burn without further application of heat in a place free from draught; not more than 0.015 per cent. of carbonaceous and mineral residue remains. Subject this residue to a low red heat, until combustion is complete; not more than 0.007 per cent. of mineral ash remains. This ash, when dissolved in 10 mils of distilled water and titrated with hundredth-normal silver nitrate V.S., using potassium chromate T.S. as indicator, shows, in the original 50 Gm. of Glycerin, not more than 0.001 per cent. of chlorides calculated as sodium chloride. Each mil of hundredth-normal silver nitrate V.S. consumed corresponds to 0.0005846 Gm. of NaCl.

Mix 5 mils of Glycerin by vigorous shaking with an equal volume of sulphuric acid in a glass-stoppered cylinder; the liquid does not become darker than yellow on standing for one hour (*readily carbonizable impurities*).

Mix 50 Gm. of Glycerin with 50 mils of freshly boiled distilled water and 5 mils of half-normal potassium hydroxide V.S. and boil the mixture for five minutes. When cold, it requires not less than 4 mils of half-normal hydrochloric acid V.S. for neutralization, using phenolphthalein T.S. as indicator (*fatty acids and esters*).

An aqueous solution of Glycerin (1 in 10) remains clear on the addition of calcium chloride T.S. (*oxalic acid*); another portion of the solution is not affected by barium chloride T.S. after acidulation with a few drops of diluted hydrochloric acid (*sulphate*).

An aqueous solution of Glycerin does not respond to the Test for heavy metals (see Part II, Test No. 3).

An aqueous solution of Glycerin meets the requirements of the Test for arsenic (see Part II, Test No. 1).

A mixture of 5 mils of Glycerin and 5 mils of an aqueous solution of potassium hydroxide (1 in 10) does not become yellow when kept for five minutes at 60° C. (*acrolein, glucose*), nor emit an odor of ammonia (*ammonium compounds*).

Preparations—Gelatinum Glycerinatum   Suppositoria Glycerini   Glycerites.

AVERAGE DOSE—Metric, 4 mils—Apothecaries, 1 fluidrachm.

GLYCERITUM ACIDI TANNICI

Glycerite of Tannic Acid

Glycer. Acid. Tann.—Glycerite of Tannin

Tannic Acid, *twenty grammes*	20 Gm.
Glycerin, *eighty grammes*	80 Gm.
To make *one hundred grammes*	100 Gm.

Weigh the glycerin into a tared, wide-mouthed bottle with a capacity of about *one hundred and twenty-five mils*. Place the bottle and contents in a water bath, heat the water until it boils, and continue the heat for a few minutes; add the tannic acid to the hot glycerin in small, successive portions, agitate the mixture until the tannic acid is dissolved and strain the solution while warm through purified cotton.

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

GLYCERITUM AMYLI

Glycerite of Starch

Glycer. Amyl.

Starch, *ten grammes*	10 Gm.
Water, *ten milliliters*	10 mils
Glycerin, *eighty grammes*	80 Gm.

Triturate the starch with the water, until a homogeneous mixture is produced. Then gradually add this to the glycerin, contained in a porcelain dish, and heated to about 140° C. Continue the heat, with constant stirring, keeping it below 144° C., until a translucent jelly is formed. Transfer the product to suitable vessels, provided with well-fitting covers.

GLYCERITUM BOROGLYCERINI

Glycerite of Boroglycerin

Glycer. Boroglyc.

Boric Acid, in fine powder, *three hundred and ten grammes*	310 Gm.
Glycerin, *a sufficient quantity,*	
To make *one thousand grammes*	1000 Gm.

Heat *four hundred and sixty grammes* of glycerin, in a tared porcelain dish on a sand bath, to a temperature between 140° C. and 150° C., and add the boric acid in portions, constantly stirring. When all is added and dissolved, continue the heat at the same temperature, frequently stirring, and breaking up the film which forms on the surface until the mixture has been reduced to the weight of *five hundred grammes*, then add to it *five hundred grammes* of glycerin, mix thoroughly, and immediately transfer it to bottles and stopper them tightly.

GLYCERITUM HYDRASTIS

Glycerite of Hydrastis

Glycer. Hydrast.—Glycerite of Golden Seal

One hundred mils of Glycerite of Hydrastis yields not less than 1.12 Gm. nor more than 1.37 Gm. of the ether-soluble alkaloids of hydrastis.

Hydrastis, in No. 60 powder, *one thousand grammes*	1000 Gm.
Glycerin,	
Alcohol,	
Water, each, *a sufficient quantity,*	
To make about *one thousand milliliters*	1000 mils

Moisten the hydrastis with *three hundred and fifty mils* of alcohol, pack it firmly in a cylindrical percolator, and add enough alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed slowly, gradually adding alcohol, until the drug is exhausted. Remove nearly all of the alcohol by distillation or evaporation, pour the thick concentrated liquid into *four hundred and fifty mils* of ice-cold water, and set it aside, in a cold place, for twenty-four hours. Then filter and assay a portion of this filtrate by the process given below, and, from the result thus obtained, ascertain by calculation the amount of ether-soluble alkaloids in the remainder of the liquid. Add to this enough cold water to make each *one hundred mils* of the product contain 2.5 Gm. of the ether-soluble alkaloids of hydrastis. Finally add an equal volume of glycerin, and mix.

Assay—Proceed as directed under *Fluidextractum Belladonnæ Radicis*, page 178, first line of the Assay, modifying the process there given by using 5 mils of Glycerite of Hydrastis instead of 10 mils of fluidextract of belladonna root and using only ether as the immiscible solvent throughout the assay. Wash the final ether extractions with 10 mils of distilled water, draw off the water and discard it.

Then filter the ether solution through a pledget of purified cotton, wash the cotton with ether, evaporate the filtrate and washings, and dry the residue at 100° C. to constant weight instead of titrating it. The weight represents the amount of ether-soluble alkaloids in 5 mils of the Glycerite of Hydrastis.

AVERAGE DOSE—Metric, 2 mils—Apothecaries, 30 minims.

GLYCERITUM PHENOLIS

Glycerite of Phenol

Glycer. Phenol.—Glycerite of Carbolic Acid

LIQUEFIED PHENOL, *twenty milliliters*	20 mils
GLYCERIN, *eighty milliliters*	80 mils
To make *one hundred milliliters*	100 mils

Add the liquefied phenol to the glycerin and thoroughly mix.

AVERAGE DOSE—Metric, 0.3 mil—Apothecaries, 5 minims.

GLYCYRRHIZA

Glycyrrhiza

Glycyrrh.—Licorice Liquorice Root

The dried rhizome and roots of *Glycyrrhiza glabra typica* Regel et Herder, known in commerce as Spanish Licorice, or of *Glycyrrhiza glabra glandulifera* Regel et Herder, known in commerce as Russian Licorice (Fam. *Leguminosæ*).

Preserve powdered and whole Glycyrrhiza in tightly-closed containers to which a few drops of chloroform or carbon tetrachloride are added from time to time to prevent attack by insects.

Spanish Licorice (also known as Italian, Levant, Persian, Turkish, or Arabian Licorice)—Nearly cylindrical, upper portion more or less knotty; usually in pieces from 14 to 20 cm. or more in length and from 5 to 20 mm. in thickness; externally yellowish-brown or dark brown, longitudinally wrinkled, the thinner rhizomes often having prominent alternate buds, the thicker rhizomes having distinct corky patches; fracture coarsely fibrous; internally lemon-yellow, radiate; bark from 1 to 3 mm. in thickness; wood porous, in narrow wedges, rhizome with small pith; odor distinctive; taste sweetish and slightly acrid.

Under the microscope, transverse sections of pieces of the older rhizome of Spanish Licorice show a periderm of numerous layers of yellowish-brown cork cells, a phellogen and one or more rows of cells of the phelloderm, the cells showing a tendency to collenchymatous thickenings and with occasional monoclinic prisms of calcium oxalate; a middle bark of starch-bearing parenchyma and whitish groups of bast-fibers surrounded with crystal-fibers; inner bark with a very characteristic radial arrangement of phloem and medullary rays, the phloem consisting of wedges of small groups of bast-fibers and parenchyma, separated by an almost continuous, obliterated sieve tissue, the cells of the latter being very irregular in outline and with thick, highly refracting walls; medullary rays from 1 to 8 cells wide; wood characterized by broad wedges consisting of large tracheæ with yellowish walls, small compact groups of wood-fibers and starch-bearing parenchyma alternating with the broad medullary rays; pith composed of parenchyma, the cells being large, more or less polygonal in outline and containing numerous starch grains, or prisms of calcium oxalate. In sections of roots the pith is absent.

Russian Licorice—Nearly cylindrical, somewhat tapering, sometimes split longitudinally, from 15 to 30 cm. in length and from 1 to 5 cm. in diameter; when deprived of the outer corky layer, it is externally pale-yellow; fracture coarsely fibrous; internally lemon-yellow; wood radially cleft; odor distinct; taste sweetish.

Under the microscope, transverse sections of the rhizome and roots of Russian Licorice somewhat resemble those of Spanish Licorice, but the cork cells are absent.

Powdered Glycyrrhiza is pale brownish-yellow (Spanish Licorice) or pale yellow (Russian Licorice); starch grains numerous, mostly single and elliptical or oval, and from 0.002 to 0.02 mm. in diameter; tracheæ mostly with bordered pores; wood- and bast-fibers numerous, strongly lignified, very long, much attenuated at the ends and about 0.01 mm. in width; crystal-fibers with monoclinic prisms of calcium oxalate, the latter from 0.01 to 0.02 mm. in diameter; occasional fragments of reddish-brown cork cells occur in Spanish Licorice, but are practically absent in the Russian Licorice.

Add 10 Gm. of powdered Glycyrrhiza to 100 mils of distilled water, allow the mixture to macerate for fifteen minutes with occasional stirring; and then heat it for one-half hour on a water bath. Filter the mixture and add through the filter enough water to make the filtrate measure 100 mils; not less than 0.2 Gm. of residue remains on evaporating 10 mils of this filtrate and drying it at 100° C.

Glycyrrhiza yields not more than 7 per cent. of ash.

Preparations—Extractum Glycyrrhizæ Purum Fluidextractum Glycyrrhizæ Elixir Glycyrrhizæ (from Fluidextract) Mistura Glycyrrhizæ Composita (from Extract) Pulvis Glycyrrhizæ Compositus.

AVERAGE DOSE—Metric, 2 Gm.—Apothecaries, 30 grains.

GLYCYRRHIZINUM AMMONIATUM

Ammoniated Glycyrrhizin

Glycyrrh. Ammon.

A sweet principle combined with ammonia obtained from glycyrrhiza.

Ammoniated Glycyrrhizin occurs in dark brown or brownish-red scales, without odor, and having a very sweet taste.

It is freely soluble in water and soluble in alcohol.

Its aqueous solution when heated with potassium hydroxide T.S. evolves ammonia.

Supersaturate an aqueous solution of Ammoniated Glycyrrhizin with an acid; a precipitate is produced (consisting essentially of *glycyrrhizin*), which, when dissolved in hot water, forms a jelly on cooling. This substance, after being washed with diluted alcohol and dried, appears as an amorphous, yellow powder, having a strong, bitter-sweet taste, and an acid reaction.

Incinerate 0.5 Gm. of Ammoniated Glycyrrhizin; not more than 0.5 per cent. of ash remains.

AVERAGE DOSE—Metric, 0.25 Gm.—Apothecaries, 4 grains.

GOSSYPIUM PURIFICATUM

Purified Cotton

Gossyp. Purif.—Absorbent Cotton

The hairs of the seed from one or more of the cultivated varieties of *Gossypium herbaceum* Linné (Fam. *Malvaceæ*), freed from adhering impurities and linters and deprived of fatty matter.

Purified Cotton occurs in white, soft, fine filaments, appearing under the microscope as hollow, flattened and twisted bands, spirally striate, and slightly thickened at the edges; inodorous and almost tasteless; insoluble in ordinary solvents, but soluble in an ammonia solution of cupric oxide.

When Purified Cotton, previously compressed in the hand, is thrown on the surface of cold water, it readily absorbs the latter and sinks.

Incinerate 5 Gm. of Purified Cotton; not more than 0.2 per cent. of ash remains.

Thoroughly saturate about 10 Gm. of Purified Cotton with 100 mils of distilled water, then with the aid of a glass rod press out two portions of the water, 25 mils each, into white porcelain dishes. Add to one portion 3 drops of phenolphthalein T.S. and to the other portion 1 drop of methyl orange T.S.; no pink color develops in either portion (*alkali or acid*).

Extract 5 Gm. of Purified Cotton, tightly packed in a narrow percolator, with ether, until the percolate measures 20 mils, and evaporate this to dryness; the residue does not exceed 0.6 per cent. (*fatty matter*).

Extract 10 Gm. of Purified Cotton, in a narrow percolator, with alcohol, until the percolate measures 100 mils. When observed downward through a column 20 cm. in depth, the percolate may show a yellowish color, but no blue or green tint (*dyes*); and, on evaporating this percolate to dryness, the weight of the residue does not exceed 0.5 per cent. (*resins and soap*).

GRANATUM

Pomegranate

Granat.—Pomegranate Bark

The dried bark of the stems and roots of *Punica Granatum* Linné (Fam. *Punicaceæ*), without the presence or admixture of more than 2 per cent. of wood or other foreign matter. Preserve it in tightly-closed containers.

The stem bark is mostly in somewhat flattened or transversely curved pieces, to some extent in quills, from 2 to 8 cm. in length; bark from 0.5 to 3.5 mm. in thickness; outer surface yellowish to grayish-brown, with grayish patches of foliaceous lichens with their brownish-black apothecia, longitudinally wrinkled, also marked with small, broadly elliptical lenticels and with more or less abraded patches of cork; inner surface light yellow or yellowish-brown, finely striate; fracture short, smooth, inner bark yellowish-green; odor slight; taste astringent, somewhat bitter and nauseous.

The root bark is in transversely curved pieces; externally brownish-yellow to dark brown with irregular patches of cork; internally dark yellow, the medullary rays extending nearly to the outer surface.

The powder is yellowish-brown to dark brown; calcium oxalate crystals in rosette aggregates, monoclinic prisms or crystal fibers, the individual crystals from 0.01 to 0.018 mm. in diameter; starch grains numerous, spherical, ellipsoidal biconvex, polygonal or irregular, and single or compound, from 0.002 to 0.01 mm. in diameter; fragments of whitish cork with strongly lignified walls;

stone cells mostly single, occasionally in small groups, the individual cells from 0.05 to 0.18 mm. in length, the walls being very thick and strongly lamellated; occasional fragments of wood with long wood-fibers from 0.015 to 0.02 mm. in width, the walls being slightly lignified and from 0.003 to 0.008 mm. in thickness and associated with tracheæ possessing simple and bordered pores.

Mix 1 Gm. of powdered Pomegranate with 100 mils of distilled water, macerate it with occasional agitation for about an hour and filter; a light yellow filtrate is obtained. Upon the addition of a drop of ferric chloride T.S. to 10 mils of this filtrate a bluish-black precipitate is produced. Upon the addition of from 40 to 50 mils of lime water to another portion of 10 mils of the filtrate, an orange-brown, flocculent precipitate is produced.

Pomegranate yields not more than 16 per cent. of ash.

Preparation—Fluidextractum Granati.

Average dose—Metric, 2 Gm.—Apothecaries, 30 grains.

GRINDELIA

Grindelia

Grindel.

The dried leaves and flowering tops of *Grindelia camporum* Greene, or *Grindelia cuneifolia* Nuttall, or *Grindelia squarrosa* (Pursh) Dunal (Fam. *Compositæ*), without the presence or admixture of more than 10 per cent. of stems or other foreign matter.

Stems with attached branches and terminated with resinous flower-buds; stems cylindrical, not exceeding 2 mm. in diameter; light yellow or rose-colored, with alternate leaf-scars, occasionally with basal portions of leaves, sometimes more or less irregularly flexuous and coated with resin, especially at the nodes; leaves usually separate and more or less broken and varying in shape when entire from oblong and lanceolate to oblanceolate-spatulate and cuneate-spatulate, from 1 to 7 cm. in length, mostly sessile or amplexicaul and more or less sharply serrate or evenly spinosely-toothed, pale yellow to yellowish-green, very resinous, somewhat coriaceous and brittle; bracts of flowering branches almost entire and usually more or less spreading; heads more or less resinous, viscid, many-flowered, either conical-urceolate or depressed-urceolate, involucres from 5 to 20 mm. in breadth, composed of numerous imbricated bracts with more or less recurved tips; ray flowers yellow, ligulate and pistillate; disk florets yellow, tubular and perfect; pappus of two or three mostly unequal linear awns about the length of the disk florets; disk achenes more or less ovoid or oblong; more or less compressed or triquetrous, and either biauriculate or broadly unidentate or with a broad truncate, corky, thickened summit; odor balsamic; taste aromatic and bitter, resinous.

The powder is yellowish-brown; consisting of numerous fibrous fragments made up of tissues of the stem, the most prominent being the tracheæ with annular and spiral thickenings or marked with simple or bordered pores, associated with numerous, narrow, strongly lignified wood-fibers; pith cells more or less tabular and containing a layer of protoplasm in which are embedded numerous spheroidal granules; fragments of epidermis of leaves very characteristic and showing more or less polygonal areas containing large chloroplastids, and the large, colorless, basal cells of the multicellular glandular hairs; pollen grains spherical, about 0.035 mm. in diameter, spinose, and in section showing three pores.

Preparation—Fluidextractum Grindeliæ.

Average dose—Metric, 2 Gm.—Apothecaries, 30 grains.

GUAIACOL

Guaiacol

The monomethyl ether [$C_7H_8O_2$ or $C_6H_4(OH)(OCH_3)$ 1 : 2 = 124.06] of ortho-dihydroxybenzene, obtained from wood-tar creosote or prepared synthetically. Preserve it in well-closed containers, protected from light.

Guaiacol is a colorless or yellowish, strongly refractive liquid, or a colorless or yellowish, crystalline solid, having an agreeable, aromatic odor. It becomes darker on exposure to light and air. The solid form when liquefied may remain so for some time, even at a low temperature.

One Gm. of Guaiacol dissolves in 53 mils of water and in 0.8 mil of glycerin at 25° C., but separates from the glycerin on the addition of water; miscible with alcohol, chloroform, ether or acetic acid.

The specific gravity of liquid Guaiacol is between 1.110 and 1.114 at 25° C.

Solid Guaiacol melts at about 28° C.

Not less than 85 per cent. of Guaiacol distils between 200° and 210° C.

The addition of a drop of ferric chloride T.S. to 10 mils of an alcoholic solution of Guaiacol (1 in 100) produces an immediate blue color, changing to emerald-green, and finally becoming yellowish.

Incinerate about 1 Gm. of Guaiacol; not more than 0.1 per cent. of ash remains.

Shake 2 mils of liquefied Guaiacol with 4 mils of purified petroleum benzin; the mixture separates on standing into two distinct, clear layers. Permanent turbidity or failure to separate into layers indicates the presence of impurities.

One mil of liquefied Guaiacol dissolves in 2 mils of potassium hydroxide solution (15 per cent.), when heated for one minute in boiling water; on cooling, it congeals to a nearly white mass. Much coloration or failure to congeal indicates the presence of impurities. The mass thus obtained forms a clear solution with 20 volumes of distilled water (turbidity indicates *oily hydrocarbons*).

AVERAGE DOSE—Metric, 0.5 mil—Apothecaries, 8 minims.

GUAIACOLIS CARBONAS

Guaiacol Carbonate

Guaiacol. Carb.

A guaiacol derivative [$(C_7H_7O)_2CO_3$ or $(C_6H_4(OCH_3)O)_2.CO$ = 274.11].

Guaiacol Carbonate is a crystalline powder, odorless and tasteless or having a slight, aromatic odor and taste.

Guaiacol Carbonate is insoluble in water; 1 Gm. dissolves in 60 mils of alcohol, 1 mil of chloroform, and in 18 mils of ether at 25° C.; freely soluble in benzene and slightly soluble in glycerin or fixed oils; freely soluble in boiling alcohol.

It melts between 83° and 87° C.

Incinerate 1 Gm. of Guaiacol Carbonate; not more than 0.1 per cent. of ash remains.

A saturated alcoholic solution of Guaiacol Carbonate yields no bluish-green color on the addition of ferric chloride T.S. (*free guaiacol*), and is not acid to litmus paper which has been previously moistened with distilled water.

One-tenth Gm. of Guaiacol Carbonate dissolves in 2 mils of sulphuric acid without producing more than a faint yellow color (*readily carbonizable impurities*).

Heat about 0.5 Gm. of Guaiacol Carbonate for a few minutes with 10 mils of alcoholic potassium hydroxide T.S. and cool the mixture; a crystalline precipitate is formed, which effervesces with acids. If the alcohol is evaporated from the filtered liquid, the residue supersaturated with diluted sulphuric acid and shaken out with ether, the separated ether layer, upon spontaneous evaporation of the ether, leaves a residue which responds to the tests for identity under *Guaiacol.*

Average dose—Metric, 1 Gm.—Apothecaries, 15 grains.

GUAIACUM

Guaiac

Guaiac.—Guaiac Resin

The resin of the wood of *Guaiacum officinale* Linné, or of *Guaiacum sanctum* Linné (Fam. *Zygophyllaceæ*).

In irregular fragments or in large, nearly homogeneous masses, occasionally in more or less rounded or ovoid tears, enclosing fragments of vegetable tissues; externally brown, becoming greenish-gray-brown on exposure, the fractured surface having a glassy luster, the thin pieces being translucent and varying in color from reddish to yellowish-brown; odor balsamic; taste slightly acrid.

Guaiac melts between 85° and 90° C. It is readily soluble in alcohol, ether, chloroform, creosote, and in solutions of the alkalies or in hydrated chloral T.S. It is sparingly soluble in carbon disulphide or benzene and not more than 15 per cent. is insoluble in alcohol; the alcoholic solution, on the addition of an excess of chlorine water or tincture of ferric chloride, becomes blue, changing quickly to green, the color being best seen when the solutions are diluted with an equal volume of water.

Macerate the crushed or powdered Guaiac with 4 or 5 times its weight of purified petroleum benzin for three hours and then filter; the filtrate is colorless, and does not give a green color on the addition of an equal volume of cupric acetate T.S. (*rosin*).

The powder is grayish, becoming green on exposure to the air.

Guaiac yields not more than 4 per cent. of ash.

Preparations—Tinctura Guaiaci Tinctura Guaiaci Ammoniata.

Average dose—Metric, 1 Gm.—Apothecaries, 15 grains.

GUARANA

Guarana

A dried paste consisting chiefly of the crushed seeds of *Paullinia Cupana* Kunth (Fam. *Sapindaceæ*), yielding not less than 4 per cent. of caffeine.

Usually in cylindrical sticks, about 3 to 5 cm. in diameter, externally dark reddish-brown; hard and heavy; fracture uneven, often fissured in the center; internally pale reddish-brown, showing more or less coarse fragments of seeds and occasionally their blackish-brown integuments; odor slight; taste slightly astringent and bitter.

The powder is light pinkish-brown; consisting mostly of irregular masses of parenchyma containing more or less altered starch grains; unaltered starch grains occasional, varying from spherical and polygonal to ellipsoidal and broadly ovoid, 0.01 to 0.025 mm. in diameter; occasional fragments with narrow, elongated sclerenchymatous cells; the walls being thick, yellowish and non-lignified.

Place on a slide a drop of hydrochloric acid, add about 0.001 Gm. of powdered Guarana, then add a drop of gold chloride T.S. and allow the mixture to stand for a few minutes; beginning at the edge of the mount, crystals of caffeine and gold chloride separate in the form of orthorhombic plates and needles, the latter usually occurring in spheroidal aggregates and finally forming branching groups.

Assay—Introduce 6 Gm. of Guarana, in No. 60 powder, into a flask and add 120 mils of chloroform and 6 mils of ammonia water. Stopper the flask, shake it frequently for half an hour, then let it stand four hours. Again shake the flask vigorously and when the drug has settled, filter the liquid rapidly through a pledget of purified cotton and collect 100 mils of the filtrate, representing 5 Gm. of Guarana. Evaporate the clear filtrate to dryness and dissolve the residue in weak sulphuric acid with the aid of a gentle heat. When the liquid has cooled, filter it into a separator and wash the container and filter with several small portions of distilled water. Now add ammonia water until the liquid is distinctly alkaline to litmus and shake out the caffeine with chloroform until completely extracted, as shown by testing with iodine T.S. in place of the usual mercuric potassium iodide T.S. Evaporate the united chloroform solutions and dry the residue to constant weight at 80° C. The weight is the amount of caffeine from 5 Gm. of Guarana (see Proximate Assays, Part II).

Preparation—Fluidextractum Guaranæ.

AVERAGE DOSE—Metric, 2 Gm.—Apothecaries, 30 grains.

HEXAMETHYLENAMINA

Hexamethylenamine

Hexam.—Hexamethylene-tetramine

A condensation product of ammonia and formaldehyde, hexamethylene-tetramine [$(CH_2)_6N_4 = 140.14$]. Preserve it in well-closed containers.

Hexamethylenamine occurs in colorless, lustrous, odorless crystals, or as a white, crystalline powder.

One Gm. of Hexamethylenamine dissolves in 1.5 mils of water, 12.5 mils of alcohol and in 320 mils of ether at 25° C.; soluble in chloroform.

Its aqueous solution is alkaline to litmus.

At about 263° C. it sublimes without melting and with partial decomposition, emitting a disagreeable odor.

Heat an aqueous solution (1 in 10) with diluted sulphuric acid; it decomposes with the liberation of formaldehyde (recognized by its odor or by its darkening paper moistened with silver ammonium nitrate T.S.).

When an aqueous solution (1 in 10) is heated with diluted sulphuric acid and then supersaturated with solution of sodium hydroxide, ammonia is liberated.

Incinerate 2 Gm. of Hexamethylenamine; not more than 0.05 per cent. of ash remains.

An aqueous solution of Hexamethylenamine (1 in 50) does not become colored or turbid when mixed with an equal volume of hydrogen sulphide T.S. (*heavy metals*). Separate portions of 10 mils each of an aqueous solution of Hexamethylenamine (1 in 50), acidulated with 5 drops of nitric acid, are not rendered turbid by a few drops of barium chloride T.S. (*sulphate*) nor more than slightly opalescent by a few drops of silver nitrate T.S. (*chloride*).

Add 1 mil of alkaline mercuric potassium iodide T.S. to 10 mils of an aqueous solution of Hexamethylenamine (1 in 20); no other color is produced than that which results from the addition of the same amount of the reagent to 10 mils of distilled water (*ammonium salts*).

AVERAGE DOSE—Metric, 0.25 Gm.—Apothecaries, 4 grains.

HOMATROPINÆ HYDROBROMIDUM

Homatropine Hydrobromide

Homatrop. Hydrobr.—Homatropine Bromide

The hydrobromide [$C_{16}H_{21}O_3N.HBr = 356.11$] of homatropine, an alkaloid obtained by the condensation of tropine and mandelic acid. Preserve it in well-closed containers, protected from light.

Homatropine Hydrobromide occurs as a white, odorless, crystalline powder, or in rhombic prisms. *Great caution must be observed in tasting it, using only very dilute solutions.* Its solution when locally applied dilates the pupil of the eye.

One Gm. of Homatropine Hydrobromide dissolves in 6 mils of water, 40 mils of alcohol, and in 420 mils of chloroform at 25° C.; also in 12 mils of alcohol at 60° C.; insoluble in ether.

Its aqueous solution (1 in 20) is neutral to litmus.

It melts at about 212° C. with partial decomposition.

Shake 2 mils of chloroform with 1 mil of an aqueous solution of the salt (1 in 10) to which a few drops of chlorine water have been added; the chloroform assumes a brownish color.

When added to solutions of Homatropine Hydrobromide, iodine T.S. produces a brown precipitate; silver nitrate T.S. in similar solutions produces a yellowish-white precipitate insoluble in nitric acid.

No weighable ash remains on incinerating 0.1 Gm. of Homatropine Hydrobromide.

Separate portions of 1 mil each of an aqueous solution of the salt (1 in 20) are not precipitated by tannic acid T.S.; or, after acidulation with hydrochloric acid, by platinic chloride T.S. (*foreign alkaloids*).

Add a slight excess of ammonia water to 1 mil of an aqueous solution of the salt (1 in 100), shake it out with chloroform and evaporate the chloroformic solution to dryness on a water bath. The residue becomes yellow and finally brick-red in color when warmed with about 1.5 mils of a solution made by dissolving 1 Gm. of mercuric chloride in 50 mils of a mixture of 5 volumes of alcohol and 3 volumes of distilled water (distinction from *most other alkaloids except atropine and hyoscyamine*).

Evaporate about 0.01 Gm. of Homatropine Hydrobromide, with 5 drops of nitric acid, to dryness in a porcelain dish on a water bath; the residue acquires no violet color on the addition of a few drops of alcoholic potassium hydroxide T.S. (*atropine, hyoscyamine, or hyoscine*).

AVERAGE DOSE—Metric, 0.0005 Gm.—Apothecaries, 1/120 grain.

HUMULUS

Hops

Humul.

The carefully dried strobiles of *Humulus Lupulus* Linné (Fam. *Moraceæ*) bearing their glandular trichomes and without the presence or admixture of more than 2 per cent. of stems, leaves or other foreign matter. Preserve it in tightly-closed containers, protected from light.

Strobile ovoid-cylindrical, about 3 cm. in length, consisting of a narrow, hairy, flexuous rachis and numerous, imbricated, yellowish-green to pale brown, obliquely-ovate, membranous scales, the base of each with numerous, yellowish-brown glandular hairs, and frequently infolded on one side, enclosing a subglobular, light brown, very glandular achene; odor strong and characteristic, becoming disagreeable and valerian-like on aging; taste aromatic and bitter.

Hops yield not more than 8 per cent. of ash.

AVERAGE DOSE—Metric, 2 Gm.—Apothecaries, 30 grains.

HYDRARGYRI CHLORIDUM CORROSIVUM

Corrosive Mercuric Chloride

Hydrarg. Chlor. Corr.—Bichloride of Mercury Corrosive Sublimate
Mercuric Chloride Perchloride of Mercury

It contains, when dried to constant weight in a desiccator over sulphuric acid, not less than 99.5 per cent. of $HgCl_2$ (271.52). Preserve it in well-closed containers.

Corrosive Mercuric Chloride occurs as heavy, colorless, rhombic crystals, or crystalline masses, or as a white powder, odorless, permanent in the air, and having a characteristic and persistent metallic taste. *Great caution should be used in tasting it.*

One Gm. of Corrosive Mercuric Chloride dissolves in 13.5 mils of water, 3.8 mils of alcohol, about 12 mils of glycerin, and in 22 mils of ether, at 25° C.; also in 2.1 mils of boiling water and 1.6 mils of boiling alcohol.

The salt fuses to a colorless liquid at 265° C. and at about 300° C. it volatilizes in dense, white vapors, leaving not more than 0.1 per cent. of residue.

An aqueous solution of Corrosive Mercuric Chloride (1 in 20) is acid to litmus, but becomes neutral upon the addition of sodium chloride.

Separate portions of an aqueous solution of the salt (1 in 20) yield a white precipitate with ammonia water; a black precipitate with an excess of hydrogen sulphide; a red precipitate, soluble in an excess of the reagent, with potassium iodide T.S.; and a white precipitate, insoluble in nitric acid, with silver nitrate T.S.

Not more than 0.5 per cent. of residue remains on dissolving finely powdered Corrosive Mercuric Chloride in ether or alcohol.

Assay—Dissolve about 0.5 Gm. of Corrosive Mercuric Chloride, previously dried to constant weight in a desiccator over sulphuric acid and accurately weighed, in 300 mils of cold distilled water to which 1 mil of hydrochloric acid has been added. Pass hydrogen sulphide through the cold solution until saturated and the precipitate of mercuric sulphide readily subsides, leaving a clear supernatant liquid. Collect the precipitate on counterpoised filters, wash it well with cold distilled water and finally with three portions of about 10 mils each of alcohol. Then close the tip of the funnel with a cork stopper, add sufficient carbon tetrachloride to cover the precipitate, cover the funnel with a watch-glass, and allow it to stand for about half an hour. Then drain off the solvent and wash the precipitate with further portions of carbon tetrachloride until after evaporating about 1 mil of the filtrate no visible residue remains. Remove the adhering carbon tetrachloride by washing with several portions of 10 mils each of alcohol and, after drying in the air, transfer to an oven and dry to constant weight at about 110° C. The weight of mercuric sulphide obtained, when multiplied by 1.167, indicates its equivalent in $HgCl_2$, which corresponds in the dried salt to not less than 99.5 per cent. of $HgCl_2$.

Each gramme of Corrosive Mercuric Chloride, previously dried to constant weight, corresponds to 0.8526 Gm. of mercuric sulphide.

Corrosive Mercuric Chloride, previously dried to constant weight, may also be assayed by the Electrolytic method (see Part II, Test No. 4).

Preparation—Toxitabellæ Hydrargyri Chloridi Corrosivi.

AVERAGE DOSE—Metric, 0.003 Gm.—Apothecaries, 1/20 grain.

HYDRARGYRI CHLORIDUM MITE

Mild Mercurous Chloride

Hydrarg. Chlor. Mit.—Mercurous Chloride Calomel Protochloride of Mercury Subchloride of Mercury

It contains, when dried to constant weight in a desiccator over sulphuric acid, not less than 99.6 per cent. of HgCl (236.06). Preserve it in well-closed containers, protected from light.

Mild Mercurous Chloride is a white, impalpable powder, becoming yellowish-white on being triturated with strong pressure, and showing only small, isolated crystals when viewed under a lens having a magnifying power of one hundred diameters. It is odorless and tasteless, and permanent in the air.

Mild Mercurous Chloride is insoluble in water, alcohol, ether or cold dilute acids.

When strongly heated, Mild Mercurous Chloride is volatilized without fusion or the evolution of brown vapors, leaving not more than 0.1 per cent. of residue.

The salt is blackened by contact with calcium hydroxide T.S., with solutions of alkali hydroxides or with ammonia water.

When heated with an equal weight of dried sodium carbonate (free from chloride) in a dry glass tube, Mild Mercurous Chloride yields a sublimate of metallic mercury. Dissolve the residue in nitric acid and filter; silver nitrate T.S. produces in the filtrate a white, curdy precipitate insoluble in nitric acid.

Shake 2 Gm. of the salt with 20 mils of ether, filter, evaporate the filtrate, and add 10 mils of distilled water; not more than a slight opalescence results upon the addition of silver nitrate T.S. to 5 mils of the solution (*mercuric chloride*).

Heat 1 Gm. of the salt with potassium hydroxide T.S.; no ammonia is evolved (*ammoniated mercury*).

Assay—Mix, in a tared flask, about 1 Gm. of Mild Mercurous Chloride, previously dried to constant weight in a desiccator over sulphuric acid and accurately weighed, with 10 mils of distilled water, add 50 mils of tenth-normal iodine V.S. and 5 Gm. of potassium iodide, dissolved in 10 mils of distilled water, stopper the flask, allow the mixture to stand, with occasional agitation, until complete solution has taken place and estimate the excess of iodine by titration with tenth-normal sodium thiosulphate V.S., starch T.S. being used as indicator. It shows, in the dried salt, not less than 99.6 per cent. of HgCl.

Each mil of tenth-normal iodine V.S. used corresponds to 0.023606 Gm. of HgCl. Each gramme of Mild Mercurous Chloride, previously dried to constant weight, corresponds to not less than 42.2 mils of tenth-normal iodine V.S.

Mild Mercurous Chloride, previously dried to constant weight, may also be assayed by the Electrolytic method (see Part II, Test No. 4).

Preparation—Pilulæ Catharticæ Compositæ.

	Metric	Apothecaries
AVERAGE DOSE—Laxative,	0.15 Gm.—	2½ grains.
Alterative,	0.015 Gm.—	¼ grain.

HYDRARGYRI IODIDUM FLAVUM

Yellow Mercurous Iodide

Hydrarg. Iod. Flav.—Mercurous Iodide Protoiodide of Mercury
Yellow Iodide of Mercury

It contains, when dried to constant weight in a desiccator over sulphuric acid, not less than 99 per cent. of HgI (327.52). Preserve it in well-closed containers, protected from light.

Yellow Mercurous Iodide is a bright yellow, amorphous powder, odorless and tasteless. By exposure to light it becomes greenish in proportion as it undergoes decomposition into metallic mercury and mercuric iodide.

Yellow Mercurous Iodide is almost insoluble in water and wholly insoluble in alcohol or ether.

When slowly and moderately heated, it assumes at first an orange and then a red color, becoming yellow again on cooling. When quickly and strongly heated, it is at first partially decomposed into mercury and mercuric iodide, and finally is volatilized, leaving not more than 0.2 per cent. of residue. When heated with an equal weight of dried sodium carbonate, in a dry glass tube, Yellow Mercurous Iodide yields a sublimate of metallic mercury.

When Yellow Mercurous Iodide is heated with sulphuric acid and a little manganese dioxide, the vapor of iodine is evolved.

When 0.5 Gm. of the salt is thoroughly shaken with 10 mils of alcohol and the mixture filtered, 5 mils of the perfectly clear filtrate is not affected by an equal volume of hydrogen sulphide T.S. (*mercuric iodide*).

Assay—Transfer to a flask about 1 Gm. of Yellow Mercurous Iodide, previously dried to constant weight in a desiccator over sulphuric acid and accurately weighed, add 50 mils of tenth-normal iodine V.S. and 5 Gm. of potassium iodide, dissolved in 10 mils of distilled water, stopper the flask, and allow the mixture to stand in the tightly-stoppered flask, with occasional agitation, until complete solution has taken place. Then titrate with tenth-normal sodium thiosulphate V.S., using starch T.S. as indicator. It shows, in the dried salt, not less than 99 per cent. of HgI.

Each mil of tenth-normal iodine V.S. used corresponds to 0.032752 Gm. of HgI. Each gramme of Yellow Mercurous Iodide, previously dried to constant weight, corresponds to not less than 30.2 mils of tenth-normal iodine V.S.

Yellow Mercurous Iodide, previously dried to constant weight, may also be assayed by the Electrolytic method (see Part II, Test No. 4).

AVERAGE DOSE—Metric, 0.01 Gm.—Apothecaries, 1/6 grain.

HYDRARGYRI IODIDUM RUBRUM

Red Mercuric Iodide

Hydrarg. Iod. Rub.—Biniodide of Mercury Mercuric Iodide Red Iodide of Mercury

It contains, when dried to constant weight in a desiccator over sulphuric acid, not less than 99 per cent. of HgI_2 (451.44). Preserve it in well-closed containers, protected from light.

Red Mercuric Iodide is a scarlet-red, amorphous powder, odorless, nearly tasteless, and permanent in the air.

Red Mercuric Iodide is almost insoluble in water; 1 Gm. dissolves in 115 mils of alcohol, 910 mils of chloroform, and in 120 mils of ether at 25° C.; also in 20 mils of boiling alcohol; soluble in solutions of the soluble iodides, mercuric chloride, sodium thiosulphate, and hot solutions of the alkali chlorides.

When heated to about 150° C., the salt becomes yellow, but again assumes a red color on cooling; upon further heating, it fuses to a dark yellow liquid which, on cooling, forms a yellow, crystalline mass; at higher temperatures it is finally volatilized, leaving not more than 0.2 per cent. of residue.

Heat the salt with potassium hydroxide T.S., and add a little sugar of milk; the compound is reduced and metallic mercury is precipitated.

Boil about 0.1 Gm. of the salt with 2 mils of potassium hydroxide T.S., filter and supersaturate the filtrate with nitric acid. The liquid becomes yellow from the liberation of iodine which produces a blue color upon the addition of a few drops of starch T.S.

Agitate thoroughly about 0.5 Gm. of Red Mercuric Iodide with 10 mils of distilled water and filter; the filtrate does not become more than slightly colored by hydrogen sulphide T.S. (*soluble mercury salts*).

Two Gm. of Red Mercuric Iodide dissolves quickly in 100 mils of distilled water, containing 2 Gm. of potassium iodide, without leaving more than 0.004 Gm. of insoluble matter.

Assay—Red Mercuric Iodide, when previously dried to constant weight in a desiccator over sulphuric acid and assayed by the Electrolytic method (see Part II, Test No. 4) shows not less than 99 per cent. of HgI_2.

Preparation—Liquor Arseni et Hydrargyri Iodidi.

AVERAGE DOSE—Metric, 0.003 Gm.—Apothecaries, 1/20 grain.

HYDRARGYRI OXIDUM FLAVUM

Yellow Mercuric Oxide

Hydrarg. Oxid. Flav.

It contains, when dried to constant weight at 150° C., not less than 99.5 per cent. of HgO (216.60). Preserve it in well-closed containers, protected from light.

Yellow Mercuric Oxide is a light orange-yellow, amorphous, heavy, impalpable powder; odorless, and having a somewhat metallic taste; permanent in the air, but turning darker on exposure to light.

Yellow Mercuric Oxide is almost insoluble in water; insoluble in alcohol; readily dissolved by diluted hydrochloric or nitric acid, forming colorless solutions.

When moistened with hot distilled water, Yellow Mercuric Oxide is not alkaline to litmus.

When moderately heated, Yellow Mercuric Oxide assumes a red color. At a red heat it is completely decomposed into oxygen and metallic mercury, and is finally volatilized, leaving not more than 0.2 per cent. of residue.

A solution of 0.5 Gm. of Yellow Mercuric Oxide in 25 mils of either diluted hydrochloric or diluted nitric acid is not more than slightly turbid.

Heat 0.5 Gm. of Yellow Mercuric Oxide for two hours in a test tube, on a water bath, with a solution of 1 Gm. of oxalic acid in 10 mils of distilled water and 1 mil of ammonia water, replacing from time to time the water lost by evaporation; it is converted into white or yellowish-white mercuric oxalate (distinction from *red mercuric oxide*).

Assay—Dissolve about 0.5 Gm. of Yellow Mercuric Oxide, previously dried to constant weight at 150° C. and accurately weighed, in 10 mils of distilled water, and 5 mils of nitric acid, and further dilute the solution with 150 mils of distilled water. Then add 2 mils of ferric ammonium sulphate T.S., and titrate with tenth-normal potassium sulphocyanate V.S. to the production of a permanent yellowish-red color. It shows, in the dried Oxide, not less than 99.5 per cent. of HgO.

Each mil of tenth-normal potassium sulphocyanate V.S. used corresponds to 0.01083 Gm. of HgO. Each gramme of Yellow Mercuric Oxide, previously dried to constant weight, corresponds to not less than 91.9 mils of tenth-normal potassium sulphocyanate V.S.

Yellow Mercuric Oxide, previously dried to constant weight, may also be assayed by the Electrolytic method (see Part II, Test No. 4).

Preparation—Unguentum Hydrargyri Oxidi Flavi.

HYDRARGYRI OXIDUM RUBRUM

Red Mercuric Oxide

Hydrarg. Oxid. Rub.—Red Precipitate

It contains, when dried to constant weight at 150° C., not less than 99.5 per cent. of HgO (216.60). Preserve it in well-closed containers, protected from light.

Red Mercuric Oxide occurs as heavy, orange-red, crystalline scales, or as a crystalline powder, acquiring a yellow color when finely divided; odorless and having a somewhat metallic taste, permanent in the air.

Red Mercuric Oxide is almost insoluble in water; insoluble in alcohol; readily dissolved by diluted nitric acid, or by hydrochloric acid.

When heated to about 400° C., Red Mercuric Oxide becomes dark violet or almost black, but assumes its original color on cooling. At a red heat it is completely decomposed into oxygen and metallic mercury, and is finally volatilized without leaving more than 0.2 per cent. of residue.

A solution of 0.5 Gm. of Red Mercuric Oxide in 25 mils of either hydrochloric or nitric acid is not more than slightly turbid.

Heat 0.5 Gm. of Red Mercuric Oxide for two hours, in a test tube on a water bath, with a solution of 1 Gm. of oxalic acid in 10 mils of distilled water and 1 mil of ammonia water, replacing, from time to time, the water lost by evaporation; it will not change color within two hours (distinction from *yellow mercuric oxide*).

Mix 1 Gm. of Red Mercuric Oxide with 5 mils of distilled water, add 2 mils of sulphuric acid, cool the mixture and carefully pour upon it 2 mils of ferrous sulphate T.S.; no brown zone develops at the line of contact (*nitrate*).

Assay—Dissolve about 0.5 Gm. of Red Mercuric Oxide, previously dried to constant weight at 150° C. and accurately weighed, in 10 mils of distilled water and 5 mils of nitric acid, and further dilute the solution with 150 mils of distilled water. Then add 2 mils of ferric ammonium sulphate T.S., and titrate with tenth-normal potassium sulphocyanate V.S. to the production of a permanent yellowish-red color. It shows, in the dried Oxide, not less than 99.5 per cent. of HgO.

Each mil of tenth-normal potassium sulphocyanate V.S. used corresponds to 0.01083 Gm. of HgO. Each gramme of Red Mercuric Oxide, previously dried to constant weight, corresponds to not less than 91.9 mils of tenth-normal potassium sulphocyanate V.S.

Red Mercuric Oxide, previously dried to constant weight, may also be assayed by the Electrolytic method (see Part II, Test No. 4).

HYDRARGYRI SALICYLAS

Mercuric Salicylate

Hydrarg. Salicyl.—Mercuric Subsalicylate

A compound of mercury and salicylic acid containing not less than 54 per cent. nor more than 59.5 per cent. of Hg. Preserve it in well-closed containers protected from light.

Mercuric Salicylate is a white, slightly yellowish or slightly pinkish powder; odorless and tasteless.

Mercuric Salicylate is nearly insoluble in water or alcohol; dissolved by solutions of the fixed alkalies or their carbonates; dissolved by warm solutions of the alkali halides with the formation of double salts.

Heat about 1 Gm. of the salt with 10 mils of hydrochloric acid; a solution is obtained from which salicylic acid separates on cooling. A piece of copper foil added to a portion of the filtered solution, nearly neutralized with ammonia water, immediately becomes coated with metallic mercury. To another portion of this solution add a few drops of ferric chloride T.S.; a violet color is produced.

Incinerate about 0.5 Gm. of the salt in a porcelain crucible; not more than 0.2 per cent. of residue remains.

The salt does not redden moistened blue litmus paper (*free salicylic acid*). No dark color results at once on shaking about 0.1 Gm. of the salt with 5 mils of hydrogen sulphide T.S. (*foreign mercury compounds*). About 0.2 Gm. of the salt dissolves completely in 4 mils of normal sodium hydroxide V.S.

Assay—Digest about 0.5 Gm. of Mercuric Salicylate, accurately weighed, in 15 mils of sulphuric acid and 10 mils of nitric acid on a water bath until dissolved. Cool the solution, dilute it with 150 mils of distilled water, add 30 mils of solution of hydrogen dioxide and mix well. Now add gradually, with constant stirring, 5 mils of diluted hypophosphorous acid, then 5 Gm. of sodium chloride, dissolved in 20 mils of distilled water, stir thoroughly and allow the mixture to stand until the precipitate has subsided. Filter and wash the precipitate with distilled water. Transfer the precipitate and filter to a flask, add 50 mils of tenth-normal iodine V.S. and 2 Gm. of potassium iodide, agitate the mixture until all of the precipitate has dissolved and titrate the excess of tenth-normal iodine V.S. with tenth-normal sodium thiosulphate V.S. It shows not less than 54 per cent. nor more than 59.5 per cent. of Hg.

Each mil of tenth-normal iodine V.S. corresponds to 0.02006 Gm. of Hg. Each Gm. of Mercuric Salicylate corresponds to not less than 26.9 mils nor more than 29.7 mils of tenth-normal iodine V.S.

Mercuric Salicylate may also be assayed by the Electrolytic method (see Part II, Test No. 4).

AVERAGE DOSE—Metric, 0.004 Gm.—Apothecaries, $\frac{1}{15}$ grain.

HYDRARGYRUM

Mercury

Hydrarg.—Quicksilver

It contains not less than 99.5 per cent. of Hg (200.6). Preserve it in strong, well-closed containers.

Mercury is a shining, silver-white metal; liquid at ordinary temperatures and easily divisible into spherical globules. When cooled to about −40° C., it forms a ductile, malleable mass. It is without odor or taste.

Specific gravity: about 13.5 at 25° C.

Mercury is insoluble in the ordinary solvents, also in concentrated hydrochloric acid and, at ordinary temperatures, in sulphuric acid, but it dissolves in the latter when boiled with it, and is readily and completely dissolved by nitric acid.

At ordinary temperatures Mercury volatilizes very slowly, but more rapidly as the temperature increases, and at about 358° C. it boils and is volatilized, yielding not more than 0.02 per cent. of residue.

When globules of Mercury are dropped upon white paper, they roll about freely, retaining their globular form, and leaving no streaks or traces.

Mercury must be perfectly dry and present a bright surface even after agitation in contact with air.

Assay—Dissolve about 0.4 Gm. of Mercury, accurately weighed, in a mixture of 10 mils of distilled water and 10 mils of nitric acid, warm the solution gently until red fumes cease to be evolved and the solution is colorless, and add 150 mils of distilled water. Then add 2 mils of ferric ammonium sulphate T.S. and titrate with tenth-normal potassium sulphocyanate V.S. to the production of a permanent, yellowish-red color. It shows not less than 99.5 per cent. of Hg.

Each mil of tenth-normal potassium sulphocyanate V.S. used corresponds to 0.01003 Gm. of Hg. Each gramme of Mercury corresponds to not less than 99.2 mils of tenth-normal potassium sulphocyanate V.S.

Mercury may also be assayed by the Electrolytic method (see Part II, Test No. 4).

Preparations—Hydrargyrum cum Creta   Massa Hydrargyri   Unguentum Hydrargyri   Unguentum Hydrargyri Dilutum (from Mercurial Ointment).

HYDRARGYRUM AMMONIATUM

Ammoniated Mercury

Hydrarg. Ammon.—White Precipitate

It contains mercurammonium chloride [$HgNH_2Cl = 252.09$] corresponding to not less than 78 per cent. nor more than 80 per cent. of Hg. Preserve it in well-closed containers, protected from light.

Ammoniated Mercury occurs as white, pulverulent pieces, or as a white, amorphous powder, without odor, and having an earthy, afterwards styptic and metallic taste; permanent in the air.

Ammoniated Mercury is insoluble in water or alcohol. By prolonged washing with water it is gradually decomposed, assuming a yellow color, and becoming converted into a basic salt. Readily dissolved by warm hydrochloric, nitric, or acetic acid, and by a cold solution of ammonium carbonate. Also completely dissolved by a cold solution of sodium thiosulphate, with the evolution of ammonia; when this solution is heated for a short time, red mercuric sulphide is separated, which, on protracted boiling, turns black.

At a temperature below a red heat, Ammoniated Mercury is decomposed without fusion, and at a red heat it is volatilized without leaving more than 0.2 per cent. of residue.

When heated with potassium hydroxide T.S., the salt turns yellow, and evolves ammonia.

A solution of the salt in diluted nitric acid yields with potassium iodide T.S. a red precipitate soluble in an excess of the reagent. With silver nitrate T.S. its nitric acid solution yields a white precipitate.

The salt is completely soluble in hydrochloric acid (*mercurous salts*) without effervescence (*carbonates*).

Assay—Dissolve about 0.5 Gm. of Ammoniated Mercury, accurately weighed, in 2 mils of hydrochloric acid and 10 mils of distilled water, warming gently until solution is effected, then dilute with 300 mils of distilled water and proceed as directed under *Hydrargyri Chloridum Corrosivum*, page 214, beginning with the word "Pass" on line 4 of the Assay. The weight of mercuric sulphide obtained when multiplied by 0.862 indicates its equivalent in mercury (Hg) which corresponds to not less than 78 per cent. nor more than 80 per cent. of Hg.

Each gramme of Ammoniated Mercury corresponds to not less than 0.9047 Gm. nor more than 0.9279 Gm. of mercuric sulphide.

Ammoniated Mercury may also be assayed by the Electrolytic method (see Part II, Test No. 4).

Preparation—Unguentum Hydrargyri Ammoniati.

HYDRARGYRUM CUM CRETA

Mercury with Chalk

Hydrarg. c. Cret.—Gray Powder

It contains not less than 37 per cent. nor more than 39 per cent. of Hg.

MERCURY, *thirty-eight grammes*	38 Gm.
CLARIFIED HONEY, *ten grammes*	10 Gm.
PREPARED CHALK, *fifty-seven grammes*	57 Gm.
WATER, *a sufficient quantity,*	
To make *one hundred grammes*	100 Gm.

Weigh the mercury and clarified honey successively into a strong bottle of the capacity of *one hundred mils*, and add *two mils* of water. Cork the bottle, and shake it for about half an hour at a time, until the aggregate time of shaking reaches ten hours, or until the globules of mercury are no longer visible under a lens magnifying *four diameters*. The shaking may be more conveniently performed by mechanical means. Rub the prepared chalk with water in a mortar to a thick, creamy paste, and, having added the contents of the bottle, wash out the last portions with a little water, and triturate the whole to a uniform mixture. Finally dry the mixture, first between ample layers of bibulous paper, and afterwards, in a dish at the ordinary temperature, until it weighs *one hundred grammes*. Then reduce it to a uniform powder, without trituration, and keep it in well-closed containers, protected from light.

Mercury with Chalk is a light gray, rather damp powder, free from grittiness, without odor, and having a slightly sweet taste.

Digest 0.1 Gm. of the powder with 20 mils of warm acetic acid; the chalk dissolves with effervescence, and a residue of finely divided mercury is left. On filtering this mixture, the filtrate becomes not more than slightly opalescent on the addition of a few drops of hydrochloric acid (*mercurous oxide*).

Digest 0.1 Gm. of the powder with 20 mils of warm diluted hydrochloric acid and filter; the filtrate is not rendered more than slightly brown by hydrogen sulphide T.S. (*mercuric oxide*).

Assay—Dissolve about 1 Gm. of Mercury with Chalk, accurately weighed, in a mixture of 10 mils of distilled water and 10 mils of nitric acid and heat it on a water bath until red fumes cease to be evolved and the liquid becomes colorless. Then add 150 mils of distilled water and 2 mils of ferric ammonium sulphate T.S. and titrate the solution with tenth-normal potassium sulphocyanate V.S. It shows not less than 37 per cent. nor more than 39 per cent. of Hg.

Each mil of tenth-normal potassium sulphocyanate V.S. used corresponds to 0.01003 Gm. of Hg. Each gramme of Mercury with Chalk corresponds to not less than 36.9 mils nor more than 38.9 mils of tenth-normal potassium sulphocyanate V.S.

Mercury with Chalk may also be assayed by the Electrolytic method (see Part II, Test No. 4).

Average dose—Metric, 0.25 Gm.—Apothecaries, 4 grains.

HYDRASTINA

Hydrastine

An alkaloid [$C_{21}H_{21}O_6N = 383.18$] obtained from hydrastis or prepared synthetically. Preserve it in well-closed containers, protected from light.

Hydrastine occurs in white to creamy white, glistening prisms or as a white, micro-crystalline powder; permanent in the air.

Hydrastine is almost insoluble in water; 1 Gm. is soluble in 170 mils of alcohol, 1.4 mils of chloroform, and in 175 mils of ether at 25° C.; also in 22 mils of alcohol at 60° C.; freely soluble in benzene.

Its saturated alcoholic solution is alkaline to litmus.

It melts at about 131° C.

Sulphuric acid produces a yellow color when added to Hydrastine; on heating the mixture, a purple color develops.

Sulphuric acid containing 0.005 Gm. of molybdic acid in each mil gives with Hydrastine a green color, changing to olive-green and then to brown; nitric acid yields a reddish-yellow color; sulphuric acid containing 0.005 Gm. of selenous acid in each mil gives a light green color, changing to brown.

No weighable ash remains on incinerating 0.1 Gm. of Hydrastine.

A solution of about 0.1 Gm. of Hydrastine in 10 mils of diluted sulphuric acid shows no blue fluorescence (*hydrastinine*), but, on the gradual addition of potassium permanganate T.S., avoiding excess, a blue fluorescence develops.

An aqueous solution of Hydrastine (1 in 20), made with the aid of a slight excess of diluted hydrochloric acid, is not reddened by chlorine water (*berberine*).

Average dose—Metric, 0.01 Gm.—Apothecaries, 1/6 grain.

HYDRASTINÆ HYDROCHLORIDUM

Hydrastine Hydrochloride

Hydrastin. Hydrochl.—Hydrastine Chloride

The hydrochloride [$C_{21}H_{21}O_6N.HCl = 419.65$] of the alkaloid hydrastine. Preserve it in well-closed containers, protected from light.

Hydrastine Hydrochloride occurs as a white to creamy-white powder, odorless, and hygroscopic.

Hydrastine Hydrochloride is very soluble in water and in alcohol; slightly soluble in chloroform; very slightly soluble in ether.

An aqueous solution of the salt (1 in 20) is neutral or only slightly acid to litmus.

An aqueous solution of the salt (1 in 20) yields with silver nitrate T.S. a white precipitate, insoluble in nitric acid.

In other respects the salt responds to the tests for identity and purity under *Hydrastina*, omitting the melting point.

AVERAGE DOSE—Metric, 0.01 Gm.—Apothecaries, ⅙ grain.

HYDRASTININÆ HYDROCHLORIDUM

Hydrastinine Hydrochloride

Hydrastinin. Hydrochl.—Hydrastinine Chloride

The hydrochloride [$C_{11}H_{11}O_2N.HCl = 225.57$] of hydrastinine, an alkaloid obtained by the oxidation of hydrastine. Preserve it in well-closed containers, protected from light.

Hydrastinine Hydrochloride occurs in light yellowish needles, or as a yellowish-white, crystalline powder without odor.

One Gm. of Hydrastinine Hydrochloride dissolves in 195 mils of chloroform, and in 1820 mils of ether at 25° C.; very soluble in water and alcohol.

Its aqueous solution (1 in 20) is neutral to litmus and shows a blue fluorescence, especially when highly diluted.

It melts at about 210° C. with partial decomposition.

In an aqueous solution of the salt (1 in 20), potassium dichromate T.S. produces a precipitate which redissolves if gently heated, but on cooling the solution it separates again in glistening needles.

Silver nitrate T.S. produces in an aqueous solution of the salt a white precipitate, insoluble in nitric acid.

No weighable ash remains on incinerating 0.1 Gm. of Hydrastinine Hydrochloride.

In an aqueous solution of the salt (1 in 20), bromine T.S. produces a yellow precipitate, which is completely soluble in ammonia water, producing an almost colorless solution (*hydrastine*).

Add a few drops of ammonia water to 1 mil of an aqueous solution of Hydrastinine Hydrochloride (1 in 20); no turbidity is produced (*foreign alkaloids*).

Add slowly 4 or 5 drops of a solution of sodium hydroxide (1 in 7) to a solution of 0.2 Gm. of the salt in 3 mils of distilled water; each drop causes a milky turbidity, which disappears again on shaking (*foreign alkaloids*). From this solution, after standing for some time, pure white hydrastinine separates, and the supernatant fluid is almost colorless.

AVERAGE DOSE—Metric, 0.03 Gm.—Apothecaries, ½ grain.

HYDRASTIS

Hydrastis

Golden Seal

The dried rhizome and roots of *Hydrastis canadensis* Linné (Fam. *Ranunculaceæ*), without the presence or admixture of more than 2 per cent. of the stems, leaves or other foreign matter and yielding not less than 2.5 per cent. of the ether-soluble alkaloids of Hydrastis.

Rhizome horizontal or oblique, sub-cylindrical and usually more or less flexuous, from 1 to 5 cm. in length and from 2 to 7 mm. in diameter, occasionally with stem-bases; externally yellowish or grayish-brown, marked by numerous stem-scars and more or less annulate from scars of bud-scales, otherwise deeply longitudinally wrinkled; on the under and lateral portions arise numerous, long, filiform roots which are easily detached; fracture short, waxy; internally of a deep yellow color and consisting mostly of parenchyma enclosing an interrupted circle of small fibro-vascular bundles; odor distinctive; taste bitter.

Macerate the drug for a short time in water until it is softened, then make sections and mount them directly in sulphuric acid and examine under the microscope; in a short time numerous acicular or rod-shaped crystals separate, some attaining a length of 0.2 mm.

The powder is brownish-yellow; starch grains numerous, from 0.002 to 0.015 mm. in diameter, mostly single, nearly spherical, and either free or in the parenchyma cells; fragments with the tissues of the fibro-vascular bundles mostly associated with starch-bearing parenchyma; tracheæ with simple and bordered pores and occasionally spiral thickenings, and associated with short sclerenchymatous fibers possessing thin walls with simple pores; occasional fragments of tabular cork cells with reddish-brown walls.

Assay—Introduce 10 Gm. of Hydrastis, in No. 60 powder, into a 250 mil flask and add 100 mils of ether and proceed as directed under *Belladonnæ Radix*, page 73, third line of the Assay, beginning with the word "Stopper." Modify the process there given by using 50 mils of the ether solution, representing 5 Gm. of Hydrastis, to complete the assay. Use ether instead of chloroform for the final shaking out of the alkaloids, and dry the residue to constant weight at 100° C. instead of titrating. The weight is the amount of ether-soluble alkaloids from 5 Gm. of Hydrastis.

Preparations—Extractum Hydrastis Fluidextractum Hydrastis Glyceritum Hydrastis Tinctura Hydrastis.

AVERAGE DOSE—Metric, 2 Gm.—Apothecaries, 30 grains.

HYOSCYAMINÆ HYDROBROMIDUM

Hyoscyamine Hydrobromide

Hyoscyamin. Hydrobr.—Hyoscyamine Bromide

The hydrobromide [$C_{17}H_{23}O_3N.HBr = 370.12$] of hyoscyamine, an alkaloid obtained from hyoscyamus and other plants of the *Solanaceæ*. Preserve it in well-closed containers, protected from light.

Hyoscyamine Hydrobromide occurs in white, prismatic crystals without odor. It is deliquescent on exposure to the air. *Great caution must be observed in tasting it, using only a very dilute solution.* It dilates the pupil of the eye.

One Gm. of Hyoscyamine Hydrobromide dissolves in 2.5 mils of alcohol, 1.7 mils of chloroform, and in 2260 mils of ether at 25° C.; very soluble in water.

Its aqueous solution (1 in 20) is neutral to litmus, and is strongly lævorotatory.

It melts at about 152° C.

Silver nitrate T.S., when added to an aqueous solution of the salt, yields a yellowish-white precipitate which is insoluble in nitric acid.

Shake 2 mils of chloroform with 1 mil of an aqueous solution of the salt (1 in 10) to which a few drops of chlorine water have been added; the chloroform assumes a brownish color.

Add about 0.01 Gm. of the salt to 5 drops of nitric acid, and evaporate to dryness in a porcelain dish; the residue yields a violet color upon the addition of alcoholic potassium hydroxide T.S.

Gold chloride T.S., when added to an aqueous solution of the salt (1 in 20), yields a precipitate which, when recrystallized from a small quantity of boiling distilled water, acidulated with hydrochloric acid, is deposited on cooling in minute, lustrous, golden-yellow scales (difference from *atropine and scopolamine*).

Platinic chloride T.S. does not form a precipitate in aqueous solutions of the salt (1 in 20) (difference from *most alkaloids*).

No weighable ash remains on incinerating 0.1 Gm. of Hyoscyamine Hydrobromide.

About 0.05 Gm. of the salt dissolved in 1 mil of sulphuric acid gives not more than a faint yellow color (*carbonizable impurities*).

AVERAGE DOSE—Metric, 0.0003 Gm.—Apothecaries, $\frac{1}{200}$ grain.

HYOSCYAMUS

Hyoscyamus

Hyosc.—Henbane Hyoscyami folium P.I.

The dried leaves and flowering or fruiting tops of *Hyoscyamus niger* Linné (Fam. *Solanaceæ*), yielding not less than 0.065 per cent. of the alkaloids of Hyoscyamus.

Usually much wrinkled, with numerous stems and with the flowering or fruiting tops intermixed; leaves when entire attaining a length of 25 cm., a breadth of 10 cm., ovate or ovate-oblong, very inequilateral, the lower with short petioles, the upper sessile, summits acute, margins coarsely and angularly 1- to 4-toothed or lobed; grayish-green, glandular-hairy, particularly on the lower surfaces; flowers nearly sessile with an urn-shaped, unequally 5-toothed calyx and a campanulate corolla which in the fresh state is of a yellowish color; fruit a 2-locular pyxis, and enclosed in a large urn-shaped calyx with 5 acute teeth; odor heavy, distinctive; taste somewhat bitter and acrid.

Stems from 3 to 10 cm. in length and from 2 to 5 mm. in thickness, nearly cylindrical or somewhat compressed, longitudinally wrinkled and hairy.

The powder is grayish-green; under the microscope, it exhibits calcium oxalate crystals usually in the form of 4- to 6-sided, isolated prisms, sometimes in twins, from 0.015 to 0.025 mm. in length, also occurring in spherical aggregates either isolated or attached to the prismatic crystals, sometimes in rosette aggregates, 0.02 mm. in diameter, and occasionally in sphenoidal micro-crystals; hairs numerous, of two kinds; the non-glandular from 2 to 10 cells in length, the glandular with a 1- to many-celled head and a 1- to 4-celled stalk; fragments of epidermis with broadly elliptical stomata from 0.03 to 0.035 mm. in length and with 3 to 4 neighboring cells; fragments of tracheæ with simple or bordered pores and spiral or reticulate thickenings, also associated with sclerenchymatous fibers having thin porous walls and showing little or no lignification; pollen grains, nearly smooth and from 0.035 to 0.05 mm. in diameter.

The presence of the leaves of *Hyoscyamus muticus* Linné in either the crude or powdered Hyoscyamus may be determined by the characteristic, branching, non-glandular hairs occurring on both the stems and leaves of that species.

Hyoscyamus yields not more than 30 per cent. of ash.

Assay—Introduce 30 Gm. of Hyoscyamus, in No. 60 powder, into a 500 mil flask and add 300 mils of a mixture of 1 volume of chloroform and 2 volumes of ether. Stopper the flask, shake it well, and allow it to stand for ten minutes; then add 5 mils of ammonia water and shake the flask vigorously every ten minutes during two hours. Now add 40 mils of distilled water, again shake the flask and when the drug has settled decant 200 mils of the solution, representing 20 Gm. of Hyoscyamus, and proceed as directed under *Belladonnæ Radix*, page 73, beginning with the word "Filter" on line 7 of the Assay. Before titration treat the residue twice with 5 mils of ether and evaporate to dryness each time.

Each mil of tenth-normal sulphuric acid V.S. consumed corresponds to 28.92 milligrammes of the total alkaloids of Hyoscyamus.

Preparations—Extractum Hyoscyami Fluidextractum Hyoscyami Tinctura Hyoscyami.

AVERAGE DOSE—Metric, 0.25 Gm.—Apothecaries, 4 grains.

HYPOPHYSIS SICCA

Desiccated Hypophysis

Hypophysis Sic.—Desiccated Pituitary Body

The posterior lobe obtained from the pituitary body of cattle, cleaned, dried, and powdered.

A yellowish or grayish, amorphous powder, having a characteristic odor. It is only partially soluble in water.

AVERAGE DOSE—Metric, 0.03 Gm.—Apothecaries, ½ grain.

INFUSA

Infusions

Infusions must be *freshly made from the drugs*, and, when the strength of Infusions is not otherwise directed, they are to be prepared by the following general formula:

THE DRUG, coarsely comminuted, *fifty grammes*	50 Gm.
WATER, *a sufficient quantity*,	
To make *one thousand milliliters*	1000 mils

Introduce the substance into a suitable vessel provided with a cover, pour upon it *one thousand mils* of boiling water, cover the vessel tightly, and allow it to stand for half an hour. Then strain with expression, and pass enough water through the strainer to make the Infusion measure *one thousand mils*. If the activity of the Infusion is affected by heat, cold water only should be used.

Caution—The strength of Infusions of potent or very active drugs should be specially directed by the physician.

INFUSUM DIGITALIS

Infusion of Digitalis

Inf. Digit.

Digitalis, bruised, *fifteen grammes*	15 Gm.
Cinnamon Water, *one hundred and fifty milliliters*	150 mils
Water, a *sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Pour *five hundred mils* of boiling water upon the digitalis, contained in a suitable vessel, and allow it to macerate for one hour. Then strain, add the cinnamon water to the strained liquid, and pass enough water through the residue on the strainer to make the product measure *one thousand mils.* Mix well.

Infusion of Digitalis must be freshly prepared from the leaves.

Average dose—Metric, 4 mils—Apothecaries, 1 fluidrachm.

INFUSUM SENNÆ COMPOSITUM

Compound Infusion of Senna

Inf. Senn. Co.

Senna, *sixty grammes*	60 Gm.
Manna, *one hundred and twenty grammes*	120 Gm.
Magnesium Sulphate, *one hundred and twenty grammes*	120 Gm.
Fennel, bruised, *twenty grammes*	20 Gm.
Water, a *sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Pour *eight hundred mils* of boiling water upon the senna, manna, and fennel contained in a suitable vessel, and allow the mixture to macerate for half an hour. Then strain, express and dissolve the magnesium sulphate in the Infusion, and again strain. Lastly, add enough water through the strainer to make the Infusion measure *one thousand mils.*

This preparation must not be dispensed unless it has been recently prepared.

Average dose—Metric, 120 mils—Apothecaries, 4 fluidounces.

IODOFORMUM

Iodoform

Iodof.

Triiodomethane [CHI_3=393.77] usually obtained by the action of iodine upon alcohol or acetone, in the presence of an alkali or alkali carbonate. Preserve it in well-closed containers, in a cool place, protected from light.

Iodoform occurs as a fine, lemon-yellow powder, or in lustrous crystals of the hexagonal system, having a peculiar, very penetrating and persistent odor, and an unpleasant, slightly sweetish taste suggestive of iodine.

It is nearly insoluble in water to which it, however, imparts its odor and taste. One Gm. of Iodoform dissolves in 60 mils of alcohol, 80 mils of glycerin, 10 mils of chloroform, 7.5 mils of ether, 2.8 mils of carbon disulphide, and in 34 mils of olive oil at 25° C.; also in about 16 mils of boiling alcohol.

Its solutions are neutral to litmus.

Iodoform is slightly volatile, even at ordinary temperatures, and in boiling water distils slowly with the vapor of water. At about 115° C. it melts to a brown liquid, and at a higher temperature it decomposes, emitting vapors of iodine.

Incinerate about 1 Gm. of Iodoform; not more than 0.2 per cent. of ash remains.

Dry about 1 Gm. of Iodoform, accurately weighed, for twenty-four hours over sulphuric acid; the loss in weight does not exceed 1 per cent.

Shake about 2 Gm. of Iodoform for one minute with 5 mils of distilled water and filter; the filtrate is colorless and free from bitter taste (*soluble yellow coloring matter, picric acid*), and does not affect the color of litmus (*acids or alkalies*).

Preparation—Unguentum Iodoformi.

AVERAGE DOSE—Metric, 0.25 Gm.—Apothecaries, 4 grains.

IODUM

Iodine

It contains not less than 99.5 per cent. of I (126.92). Preserve it in glass-stoppered bottles, in a cool place.

Iodine occurs as heavy, bluish-black, brittle, rhombic plates, having a metallic luster, a distinctive odor, and a sharp and acrid taste.

Specific gravity: about 4.66 at 17° C.

Iodine imparts a deep brown, evanescent stain to the skin, and slowly destroys vegetable colors.

One Gm. of Iodine dissolves in 2950 mils of water, 12.5 mils of alcohol, 80 mils of glycerin, and in 4 mils of carbon disulphide at 25° C.; freely soluble in chloroform, ether, or aqueous solutions of iodides; its solution in alcohol or in an aqueous solution of potassium iodide has a reddish-brown color; its diluted solution in chloroform or carbon disulphide has a violet color.

Iodine volatilizes slowly at ordinary temperatures. When heated to about 114° C., it fuses and is gradually dissipated in the form of a purple vapor, leaving not more than 0.05 per cent. of residue.

Add starch T.S. to a saturated aqueous solution of Iodine; a blue color is produced. On boiling the mixture the color is discharged but reappears as it cools, unless it has been subjected to long continued boiling.

A solution of Iodine in chloroform is transparent (*moisture*).

To determine the presence of cyanogen, chlorine or bromine, proceed as follows:

Triturate 0.5 Gm. of finely powdered Iodine with 20 mils of distilled water and filter the solution. To one-half of the filtrate carefully add tenth-normal sodium thiosulphate V.S. until the solution is just decolorized. Then add a few drops of ferrous sulphate T.S., and subsequently a little sodium hydroxide T.S., and heat the mixture gently. On now adding a slight excess of hydrochloric acid, the liquid does not become blue (*cyanogen iodide*).

To the other half of the aqueous filtrate, in a test tube, add a slight excess of silver nitrate T.S., shake the liquid actively, allow the precipitate to subside, and, having poured off the clear, supernatant liquid completely, shake the precipitate with a mixture of 1 mil of ammonia water and 9 mils of distilled water, and filter. On adding a slight excess of nitric acid to the filtrate, not more than a slight opalescence makes its appearance (*chlorine or bromine*).

Assay—Introduce about 0.5 Gm. of powdered Iodine into a tared weighing-bottle, stopper, weigh accurately, and add 1 Gm. of potassium iodide dissolved in 5 mils of distilled water. Dilute this solution with distilled water to about 50 mils and titrate with tenth-normal sodium thiosulphate V.S., starch T.S. being used as indicator. It shows not less than 99.5 per cent. of I.

Each mil of tenth-normal sodium thiosulphate V.S. used corresponds to 0.012692 Gm. of I. Each gramme of Iodine corresponds to not less than 78.4 mils of tenth-normal sodium thiosulphate V.S.

Preparations—Liquor Iodi Compositus Tinctura Iodi Unguentum Iodi.

AVERAGE DOSE—Metric, 0.005 Gm.—Apothecaries, $\frac{1}{12}$ grain.

IPECACUANHA

Ipecac

Ipecac.—Ipecacuanhæ radix P.I.

The dried root of *Cephaelis Ipecacuanha* (Brotero) A. Richard, known in commerce as Rio Ipecac, or of *Cephaelis acuminata* Karsten, known in commerce as Cartagena Ipecac (Fam. *Rubiaceæ*), without the presence or admixture of more than 5 per cent. of stems or other foreign matter and yielding not less than 1.75 per cent. of the ether-soluble alkaloids of Ipecac.

Rio Ipecac—In cylindrical pieces, curved and sharply flexuous, occasionally branched, from 3 to 15 cm. in length and from 2.4 to 4 mm. in thickness; externally dark brown, closely annulated, with thickened, incomplete rings, and usually exhibiting transverse fissures with vertical sides; fracture of bark short, of wood tough, bark very thick, light brown, easily separable from the yellowish-white wood; odor very slight, distinctive, the dust sternutatory; taste bitter and nauseous, somewhat acrid.

Stems cylindrical, attaining a length of 10 cm. and a thickness of 2 mm., dark brown, finely longitudinally wrinkled and with a few elliptical scars.

Cartagena Ipecac—Cylindrical or slenderly fusiform, more or less tortuous, from 3 to 12 cm. in length and from 4 to 6.5 mm. in thickness; externally grayish-brown, the annulations usually not so numerous as in Rio Ipecac, occasionally transversely fissured and with circular scars of roots; bark 2 mm. in thickness, dark brown, smooth, somewhat horny, and easily separable from the light brown wood.

Stems attaining a length of 10 cm. and a thickness of from 2 to 3 mm., cylindrical, somewhat zigzag, due to the prominent nodes with their elliptical stem-scars, grayish or dark brown and longitudinally wrinkled; bark thin.

The powder from both varieties of Ipecac is light brown; starch grains numerous, single or from 2- to 4- or more compound, the individual grains spherical or polygonal, from 0.003 to 0.017 mm. in diameter; calcium oxalate in raphides, from 0.015 to 0.04 mm. in length, few; tracheids with bordered pores and oblique slit-like pores. The stem bark shows a few, slightly elongated stone cells, from 0.03 to 0.045 mm. in length with thick lignified walls and simple branching pores.

Ipecac yields not less than 1.8 per cent. nor more than 4.5 per cent. of ash.

Assay—Introduce 10 Gm. of Ipecac, in No. 80 powder, into a 250 mil flask, add 100 mils of ether and proceed as directed under *Belladonnæ Radix*, page 73, third line of the Assay, beginning with the word "Stopper." Modify the process there given by using 50 mils of the ether solution, representing 5 Gm. of Ipecac, to complete the assay. Use ether instead of chloroform for the final shaking out of the alkaloid, and dissolve the alkaloid from the residue in 10 mils of tenth-normal sulphuric acid V.S.

Each mil of tenth-normal sulphuric acid V.S. consumed corresponds to 24 milligrammes of the ether-soluble alkaloids of Ipecac.

Preparations—Fluidextractum Ipecacuanhæ Pulvis Ipecacuanhæ et Opii
Syrupus Ipecacuanhæ (from Fluidextract).

AVERAGE DOSE—Emetic, Metric, 1 Gm.—Apothecaries, 15 grains.

JALAPA

Jalap

Jalap.

The dried tuberous root of *Exogonium Purga* (Wenderoth) Bentham (Fam. *Convolvulaceæ*), yielding not less than 7 per cent. of the total resins of Jalap.

Fusiform, irregularly ovoid or pyriform, upper end more or less rounded, lower end slightly tapering, the large roots often incised or cut into pieces; from 4 to 15 cm. in length and from 12 to 60 mm. in diameter; externally dark brown, longitudinally wrinkled or furrowed and with numerous lenticels; hard, compact, not fibrous; when broken, internally dark brown, mealy or waxy, bark from 1 to 2 mm. in thickness, outer bundles separated from the outer cortical layer by a distinct, brown cambium zone; odor slight but distinctive, smoky; taste somewhat sweet and acrid.

The powder is light brown; starch grains numerous, single or 2- to 3-compound, and more or less swollen, ellipsoidal or ovoid with concentric or excentral lamellæ and radiating clefts or fissures, from 0.003 to 0.035 mm. in diameter; calcium oxalate in rosette aggregates from 0.01 to 0.035 mm. in diameter; tracheæ short, wide, with simple or bordered pores; lactiferous vessels with yellowish-brown, resinous masses.

Jalap yields not more than 6.5 per cent. of ash.

Assay—Pack 10 Gm. of Jalap, in No. 60 powder, in a cylindrical percolator and extract it with alcohol until the percolate measures 100 mils. Transfer 20 mils of the percolate to a separator, add 20 mils of chloroform, mix the liquids, then add 20 mils of distilled water and shake the mixture thoroughly. When the liquids have completely separated, draw off the chloroform into a tared beaker, wash the contents of the separator by rotating with 5 mils of chloroform and draw it off into the beaker. Evaporate the chloroform solution on a water bath, add about 2 mils of alcohol, again evaporate, and then dry the residue to constant weight at 100° C. The weight will be the amount of total resins from 2 Gm. of Jalap.

Preparations—Pilulæ Catharticæ Compositæ (from Resin) Pulvis Jalapæ Compositus Resina Jalapæ.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

KINO

Kino

The spontaneously dried juice of *Pterocarpus Marsupium* Roxburgh (Fam. *Leguminosæ*).

In small, brittle angular fragments, usually considerably less than 15 mm. in diameter, varying in color from dark reddish-brown to reddish-black; when crushed upon a slide and examined under the microscope the angular fragments are more or less translucent with a glass-like, conchoidal surface, the thinner pieces having a yellowish-red or deep brownish-red color, the pieces often being marked by nearly parallel, curved and straight lines; inodorous; taste very astringent; when masticated it colors the saliva somewhat pink.

The powder is of a dark brick-red color; upon the addition of water, the sharp angular fragments assume a deep rich-red color and become more or less rounded and separate into innumerable, small, granular particles among which are a large number of rod-shaped bacteria. On mounting powdered Kino in alcohol the fragments at first assume a deep red color, then mostly dissolve, leaving a number of small, colorless granules and indistinguishable, cellular fragments.

Kino is only partly soluble in cold water, and not less than 40 per cent. is soluble in boiling water. The latter solution, when cooled and filtered, shows a faintly acid reaction, gives a dark green precipitate with ferric chloride T.S. and a reddish-violet color with alkalies.

The yield of alcoholic extractive is not less than 45 per cent.

Kino contains not more than 12 per cent. of moisture, and yields not more than 3 per cent. of ash.

Preparation—Tinctura Kino.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

LACTUCARIUM

Lactucarium

Lactucar.

The dried milk-juice of *Lactuca virosa* Linné (Fam. *Compositæ*).

Usually in quarter sections of hemispherical masses, or in irregular, angular pieces; externally dull reddish- or grayish-brown; fracture tough, waxy; internally light brown or yellowish, somewhat porous; odor distinctive, opium-like; taste bitter.

Lactucarium is partly soluble in alcohol and ether and, when triturated with water, it yields a turbid mixture. Treat Lactucarium with boiling water and filter; the filtrate is clear while hot; on cooling it becomes turbid but clears upon the addition of ammonia water or alcohol; it is not colored blue by iodine T.S. (*starch*). An alcoholic solution of Lactucarium gives not more than a faint green color upon the addition of a drop of ferric chloride T.S. (*tannin*).

The powder is grayish-brown to dark brown, consisting almost entirely of irregular fragments without any cellular structure; when mounted in hydrated chloral T.S., the fragments become clear, showing granular fragments, and from this deposit, numerous rod-shaped crystals and broad monoclinic prisms as well as aggregates of these, all of which polarize light.

In the preparation of powdered Lactucarium, dry the crude drug at a temperature not exceeding 70° C.

Lactucarium contains not more than 15 per cent. of moisture, and yields not more than 10 per cent. of ash.

Preparations—Syrupus Lactucarii (from Tincture) Tinctura Lactucarii.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

LIMONIS CORTEX

Lemon Peel

Limon. Cort.

The outer rind of the fresh ripe fruit of *Citrus medica Limonum* (Risso) Hooker filius (Fam. *Rutaceæ*).

The outer, lemon-yellow or dark yellow layer, recently separated by grating or paring and consisting of an epidermal layer, numerous parenchyma cells containing yellow chromoplastids, and large oil reservoirs with globules of the volatile oil; odor highly fragrant, distinctive; taste pungent, aromatic.

Under the microscope, sections of the rind, mounted in a fixed oil, show an epidermal layer composed of small tabular cells, a hypodermal layer containing numerous plastids, a mesocarp with colorless, thin-walled parenchyma and large, elliptical oil reservoirs; parenchyma cells containing a layer of granular protoplasm adhering to the walls and occasionally membrane crystals of calcium oxalate, which are irregularly polygonal in shape, and from 0.015 to 0.025 mm. in diameter.

LINIMENTUM AMMONIÆ

Ammonia Liniment

Lin. Ammon.—Volatile Liniment Hartshorn Liniment

AMMONIA WATER, *two hundred and fifty milliliters*	250 mils
SESAME OIL, *seven hundred and fifty milliliters*	750 mils
To make *one thousand milliliters*	1000 mils

Agitate the ammonia water with the sesame oil until a uniform mixture is obtained.

LINIMENTUM BELLADONNÆ

Belladonna Liniment

Lin. Bellad.

CAMPHOR, *fifty grammes*	50 Gm.
FLUIDEXTRACT OF BELLADONNA ROOT, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Dissolve the camphor in about *eight hundred mils* of the fluidextract, and then add enough of the latter to make the product measure *one thousand mils.* Mix thoroughly.

LINIMENTUM CALCIS

Lime Liniment

Lin. Calc.—Carron Oil

SOLUTION OF CALCIUM HYDROXIDE, *five hundred milliliters*	500 mils
LINSEED OIL, *five hundred milliliters*	500 mils
To make *one thousand milliliters*	1000 mils

Mix them by agitation.

LINIMENTUM CAMPHORÆ

Camphor Liniment

Lin. Camph.—Camphorated Oil

One hundred grammes of Liniment of Camphor yields not less than 19.5 Gm. nor more than 20.5 Gm. of camphor. This preparation is not intended for hypodermic use.

CAMPHOR, in coarse powder, *two hundred grammes*	200 Gm.
COTTONSEED OIL, *eight hundred grammes*	800 Gm.
To make *one thousand grammes*	1000 Gm.

Introduce the cottonseed oil into a suitable flask or bottle, heat it on a water bath, introduce the camphor and stopper the container securely. Dissolve the camphor by agitation without the further application of heat.

Assay—Weigh 25 Gm. of Camphor Liniment into a tared 150 mil flask and connect this flask with a 500 mil distillation flask containing 275 mils of alcohol. Adjust the tube from the distillation flask so that it reaches to within 0.5 cm. of the bottom of the flask containing the Liniment and connect the latter flask with a condenser. Now heat both flasks on sand baths and regulate the temperature so that the alcohol vapors will pass rapidly through the Liniment without condensing. Receive the distillate in a flask graduated to 250 mils and continue the distillation until, at 25° C., the distillate measures 250 mils. Fill a 200 mm. polariscope tube with the distillate and take the mean of four or more readings of the rotation, beginning at zero each time. The temperature correction for each degree is half a minute, additive if above, subtractive if below 25° C. Place about 20 Gm. of the Camphor Liniment in an evaporating dish, 9 cm. in diameter, and cover it with an inverted funnel 8 cm. in diameter. Place the dish on wire gauze, 10 cm. above a Bunsen burner having a flame 4 cm. high. When the camphor has all sublimed, dissolve 0.5 Gm. of the sublimate in sufficient alcohol to make exactly 25 mils at 25° C. and take the mean of four or more polariscope readings as before. The minutes of rotation of the distillate divided by the minutes of rotation of the control test just made, and this multiplied by 20, will give the number of grammes of camphor in 100 Gm. of Camphor Liniment.

LINIMENTUM CHLOROFORMI

Chloroform Liniment

Lin. Chlorof.

CHLOROFORM, *three hundred milliliters*	300 mils
SOAP LINIMENT, *seven hundred milliliters*	700 mils
To make *one thousand milliliters*	1000 mils

Mix them by agitation.

LINIMENTUM SAPONIS

Soap Liniment

Lin. Sapon.—Liquid Opodeldoc

SOAP, dried and granulated or powdered, *sixty grammes*	60 Gm.
CAMPHOR, in small pieces, *forty-five grammes*	45 Gm.
OIL OF ROSEMARY, *ten milliliters*	10 mils
ALCOHOL, *seven hundred milliliters*	700 mils
WATER, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Dissolve the camphor and the oil of rosemary in the alcohol, add the soap and sufficient water to make the product measure *one thousand mils*. Agitate the mixture until the soap is dissolved, set it aside in a cool place for twenty-four hours, and then filter.

Preparation—Linimentum Chloroformi.

LINIMENTUM SAPONIS MOLLIS

Liniment of Soft Soap

Lin. Sapon. Moll.—Tincture of Green Soap

Soft Soap, *six hundred and fifty grammes*...............	650 Gm.
Oil of Lavender, *twenty milliliters*....................	20 mils
Alcohol, *a sufficient quantity,*	
To make *one thousand milliliters*...........	1000 mils

Mix the oil of lavender with *three hundred mils* of alcohol, dissolve in this the soft soap by stirring or agitation, and set the solution aside for twenty-four hours. Then filter it through paper, adding sufficient alcohol to make the product measure *one thousand mils.*

LINIMENTUM TEREBINTHINÆ

Turpentine Liniment

Lin. Terebinth.—Kentish's Ointment

Rosin Cerate, *six hundred and fifty grammes*...........	650 Gm.
Oil of Turpentine, *three hundred and fifty grammes*.....	350 Gm.
To make *one thousand grammes*............	1000 Gm.

Dissolve the rosin cerate, previously melted in a dish on a water bath, in the oil of turpentine, and mix them thoroughly.

LINUM

Linseed

Flaxseed

The ripe seeds of *Linum usitatissimum* Linné (Fam. *Linaceæ*), without the presence or admixture of more than 3 per cent. of other seeds or foreign matter. Preserve it in tightly-closed containers and add a few drops of carbon tetrachloride or chloroform from time to time to prevent attack by insects.

Ovate or oblong-lanceolate, flattened, obliquely pointed at one end, from 3 to 5 mm. in length; externally chestnut-brown, very smooth and shiny, the raphe extending as a distinct, light-yellow ridge along one edge; easily cut with the finger-nail; internally olive-green; oily; odor slight; taste mucilaginous and oily.

Under the microscope, transverse sections of Linseed when mounted in hydrated chloral T.S. show an epidermis with a mucilaginous layer from 0.01 to 0.03 mm. in thickness, covered by a very thin layer of cutin which is often more or less broken; two layers of parenchyma which overlie a continuous ring of stone cells having yellowish, porous walls and rather large lumina; a pigment layer, the cells having a reddish-brown content; an endosperm consisting of from 6 to 10 rows of cells surrounding the two large plano-convex cotyledons; the cells of both the endosperm and the cotyledons contain a fixed oil and aleurone grains, the latter being from 0.003 to 0.02 mm. in diameter.

The powder is lemon-yellow or light brown, consisting chiefly of large, oily globules and irregular fragments of endosperm and seed-coat; the seed-coat is characterized by the tabular pigment cells filled with a reddish-brown, insoluble content and the somewhat elongated stone cells with yellowish walls; mounts made from material from which the fixed oil has been removed show aleurone grains from 0.003 to 0.02 mm. in diameter, both free and in the cells of the endosperm and embryo.

Linseed Meal or Flaxseed Meal is light olive-brown with reddish-brown fragments; the latter very coarse and the cellular tissues are the same as those of the powder.

Powdered Linseed or Flaxseed and Linseed Meal or Flaxseed Meal must be free from any unpleasant or rancid odor.

The powder, upon extraction with purified petroleum benzin, yields not less than 30 per cent. of a fixed oil, at least 98 per cent. of which is saponifiable.

Boil 1 Gm. of the fat-free Linseed or Flaxseed Powder or Meal, with 50 mils of water, cool and filter; the filtrate gives not more than a faint blue color, on the addition of iodine T.S.

Linseed yields not more than 6 per cent. of ash.

LIQUOR ACIDI ARSENOSI

Solution of Arsenous Acid

Liq. Acid. Arsén.—Hydrochloric Solution of Arsenic Solution of Arsenic Chloride

An aqueous solution, containing arsenous acid equivalent to not less than 0.975 per cent. nor more than 1.025 per cent. of As_2O_3 (197.92).

Arsenic Trioxide, in fine powder, *ten grammes*	10 Gm.
Diluted Hydrochloric Acid, *fifty grammes*	50 Gm.
Distilled Water, *a sufficient quantity,*	
To make *one thousand grammes*	1000 Gm.

Mix the diluted hydrochloric acid with *two hundred and fifty grammes* of distilled water in a tared flask, add the arsenic trioxide, and boil until the arsenic trioxide is completely dissolved. Then allow it to cool, add enough distilled water to make the product weigh *one thousand grammes* and filter.

Solution of Arsenous Acid is a clear, colorless liquid, odorless, having an acidulous taste and an acid reaction.

Hydrogen sulphide T.S., added to Solution of Arsenous Acid, produces a lemon-yellow precipitate of arsenic trisulphide which is completely soluble in ammonium carbonate T.S.

Assay—Dilute about 20 mils of Solution of Arsenous Acid, accurately weighed, with about 50 mils of distilled water, dissolve 2 Gm. of sodium bicarbonate in this solution and titrate with tenth-normal iodine V.S., using starch T.S. as indicator. It shows not less than 0.975 per cent. nor more than 1.025 per cent. of As_2O_3.

Each mil of tenth-normal iodine V.S. used corresponds to 0.004948 Gm. of As_2O_3. Each gramme of Solution of Arsenous Acid corresponds to not less than 1.97 nor more than 2.07 mils of tenth-normal iodine V.S.

Average dose—Metric, 0.2 mil—Apothecaries, 3 minims.

LIQUOR AMMONII ACETATIS

Solution of Ammonium Acetate

Liq. Ammon. Acet.—Spirit of Mindererus

An aqueous solution containing not less than 7 per cent. of $NH_4C_2H_3O_2$ (77.07), with small amounts of acetic and carbonic acids.

Ammonium Carbonate, *five grammes*..................	5 Gm.
Diluted Acetic Acid, *one hundred milliliters*...........	100 mils

Add the ammonium carbonate (which must be in hard, translucent pieces) gradually to the cold diluted acetic acid, and stir until it is dissolved.

This preparation must not be dispensed unless it has been recently prepared.

Solution of Ammonium Acetate is a clear, colorless liquid, free from empyreumatic odor and having a mildly saline, acidulous taste, and an acid reaction.

It is volatile when heated. Not more than 0.003 Gm. of ash remains on evaporating 20 mils of the Solution and igniting the residue.

When Solution of Ammonium Acetate is heated with potassium hydroxide T.S., ammonia is evolved.

Add 1 mil each of sulphuric acid and alcohol to 5 mils of the Solution and boil the mixture; ethyl acetate is formed, recognizable by its odor.

Assay—Dilute about 25 mils of Solution of Ammonium Acetate, accurately weighed, with 100 mils of distilled water, transfer it to a distilling flask, render it alkaline with potassium hydroxide T.S. and distil the liquid until all of the ammonia has been driven over (about 100 mils of distillate), receiving the distillate under the surface of 50 mils of normal sulphuric acid V.S. contained in a flask. Then titrate with normal potassium hydroxide V.S., using methyl orange T.S. as indicator. It shows not less than 7 per cent. of $NH_4C_2H_3O_2$.

Each mil of normal sulphuric acid V.S. used corresponds to 0.07707 Gm. of $NH_4C_2H_3O_2$. Each gramme of Solution of Ammonium Acetate corresponds to not less than 0.91 mil of normal sulphuric acid V.S.

Preparation—Liquor Ferri et Ammonii Acetatis.

Average dose—Metric, 15 mils—Apothecaries, 4 fluidrachms.

LIQUOR ARSENI ET HYDRARGYRI IODIDI

Solution of Arsenous and Mercuric Iodide

Liq. Arsen. et Hydrarg. Iod.—Donovan's Solution

An aqueous solution containing not less than 0.95 per cent. nor more than 1.05 per cent. of AsI_3 (455.72) and not less than 0.95 per cent. nor more than 1.05 per cent. of HgI_2 (454.44).

Arsenous Iodide, *ten grammes*	10 Gm.
Red Mercuric Iodide, *ten grammes*	10 Gm.
Distilled Water, *a sufficient quantity,*	
To make *one thousand grammes*	1000 Gm.

Rub the arsenous iodide and red mercuric iodide together in a mortar, add *one hundred and fifty mils* of distilled water, and continue the trituration until solution is effected. Filter the solution, and pass sufficient distilled water through the filter to make the product weigh *one thousand grammes.* Mix thoroughly. Preserve it in well-filled, amber-colored bottles. It must not be dispensed if darker than pale yellow.

Solution of Arsenous and Mercuric Iodide is a clear, colorless or pale yellowish liquid, without odor, and having a disagreeable, metallic taste.

One mil of Solution of Arsenous and Mercuric Iodide, mixed with 10 mils of distilled water, to which a few drops of lead acetate T.S. have been added, produces a bright yellow precipitate.

Add a few drops of Solution of Arsenous and Mercuric Iodide to a mixture of about 0.5 Gm. of zinc and 5 mils of diluted hydrochloric acid in a test tube, and cover the mouth of the test tube with a filter paper which has been moistened with mercuric chloride T.S. and dried; a yellow stain appears upon the inner surface of the filter paper within one minute.

Assay for Arsenous Iodide—Introduce about 25 mils of Solution of Arsenous and Mercuric Iodide into a flask, weigh accurately, dilute with 25 mils of distilled water, then dissolve 2 Gm. of sodium bicarbonate in this solution and titrate it with tenth-normal iodine V.S., using starch T.S. as indicator. It shows not less than 0.95 per cent. nor more than 1.05 per cent. of AsI_3.

Each mil of tenth-normal iodine V.S. used corresponds to 0.022786 Gm. of AsI_3. Each gramme of Solution of Arsenous and Mercuric Iodide corresponds to not less than 0.42 mil nor more than 0.46 mil of tenth-normal iodine V.S.

Assay for Mercuric Iodide—Introduce about 25 mils of Solution of Arsenous and Mercuric Iodide into a flask, weigh accurately, add 5 mils of potassium hydroxide T.S. and 5 mils of solution of formaldehyde, and warm the mixture on a water bath until the mercuric salt has been completely reduced to metallic mercury. Carefully decant the clear, supernatant liquid from the residue of metallic mercury and wash the mercury carefully by decantation, with two successive portions of 25 mils each of distilled water. Dissolve the residue of metallic mercury in 5 mils of nitric acid, dilute the solution with 50 mils of distilled water, add 2 mils of ferric ammonium sulphate T.S. and titrate with tenth-normal potassium sulphocyanate V.S. to the formation of a permanent pink color. It shows not less than 0.95 per cent. nor more than 1.05 per cent. of HgI_2.

Each mil of tenth-normal potassium sulphocyanate V.S. corresponds to 0.022722 Gm. of HgI_2. Each gramme of Solution of Arsenous and Mercuric Iodide corresponds to not less than 0.42 mil nor more than 0.46 mil of tenth-normal potassium sulphocyanate V.S.

Average dose—Metric, 0.1 mil—Apothecaries, 1½ minims.

LIQUOR CALCIS

Solution of Calcium Hydroxide

Liq. Calc.—Lime Water

An aqueous solution containing not less than 0.14 per cent. of $Ca(OH)_2$ (74.09) at 25° C. Preserve it in well-filled, tightly-stoppered bottles.

The percentage of calcium hydroxide varies with the temperature at which the solution is prepared, being about 0.17 per cent. at 15° C. and diminishing as the temperature rises.

Lime, *fifty grammes*.................................. 50 Gm.
Distilled Water, *a sufficient quantity.*

Slake the lime by the very gradual addition of *one thousand mils* of distilled water, and agitate it occasionally during half an hour. Allow the suspended particles to subside, decant the supernatant liquid and reject it. Transfer the magma of calcium hydroxide to a filter and wash it repeatedly with boiling distilled water, until the washings, after acidulation with nitric acid, show not more than a faint cloudiness with silver nitrate T.S. (*chloride*). Return the magma to a suitable container, add *five thousand mils* of distilled water, agitate it thoroughly, allow the mixture to stand for twenty-four hours, agitate again, and, when the coarser particles of solid matter have subsided, pour the liquid, holding the undissolved calcium hydroxide in suspension, into a tightly-stoppered bottle. From time to time shake the bottle to insure a saturated solution. Pour off the clear liquid when required for use.

The undissolved calcium hydroxide must not be used for making additional quantities of Solution of Calcium Hydroxide unless the product is found to be of full strength when assayed.

Solution of Calcium Hydroxide is a clear, colorless liquid without odor, and having an alkaline taste.

It is strongly alkaline to litmus.

It absorbs carbon dioxide from the air, a pellicle of calcium carbonate forming on the surface of the liquid.

On being heated it becomes turbid, due to the separation of calcium hydroxide which redissolves when the liquid is cooled.

The alkaline reaction of the Solution entirely disappears after it has been saturated with carbon dioxide and subsequently boiled (*alkalies and their carbonates*).

Assay—Titrate 50 mils of Solution of Calcium Hydroxide with tenth-normal sulphuric acid V.S., using phenolphthalein T.S. as indicator; it shows not less than 0.14 per cent. of $Ca(OH)_2$.

Each mil of tenth-normal sulphuric acid V.S. used corresponds to 0.0037045 Gm. of $Ca(OH)_2$. Each mil of Solution of Calcium Hydroxide corresponds to not less than 0.38 mil of tenth-normal sulphuric acid V.S.

Preparation—Linimentum Calcis.

Average dose—Metric, 15 mils—Apothecaries, 4 fluidrachms.

LIQUOR CRESOLIS COMPOSITUS

Compound Solution of Cresol

Liq. Cresol. Co.

Cresol, *five hundred grammes*	500 Gm.
Linseed Oil, *three hundred grammes*	300 Gm.
Potassium Hydroxide, *eighty grammes*	80 Gm.
Alcohol, *thirty milliliters*	30 mils
Water, *a sufficient quantity,*	
To make *one thousand grammes*	1000 Gm.

Heat the linseed oil in a tared vessel of a capacity equal to about four times the bulk of the ingredients, on a water bath to a temperature of 70° C. Dissolve the potassium hydroxide in 50 mils of water and warm the solution to 70° C., add it to the linseed oil and mix thoroughly; then incorporate the alcohol and continue to heat the mixture without stirring until a small portion is found to be soluble in boiling water without the separation of oily drops. While yet warm add the cresol and mix thoroughly, maintaining the temperature at about 70° C. until a clear solution is produced. Finally add sufficient water to make the finished product weigh *one thousand grammes.*

Note—In this process the 80 Gm. of potassium hydroxide may be replaced by 54 Gm. of sodium hydroxide.

LIQUOR FERRI CHLORIDI

Solution of Ferric Chloride

Liq. Ferr. Chlor.—Solution of Iron Perchloride

An aqueous solution containing ferric chloride [$FeCl_3 = 162.22$], corresponding to not less than 10 per cent. nor more than 11 per cent. of Fe. Preserve it in glass-stoppered bottles protected from light.

Iron, in the form of fine, bright wire, and cut into small pieces, *one hundred and twenty-five grammes*	125 Gm.
Hydrochloric Acid, *six hundred and eighty grammes*	680 Gm.
Nitric Acid,	
Distilled Water, each, *a sufficient quantity,*	
To make *one thousand grammes*	1000 Gm.

Introduce the iron wire into a flask having a capacity of about *two thousand mils*, pour upon it a mixture of *four hundred and twenty grammes* of hydrochloric acid and *two hundred and fifty mils* of distilled water and heat the mixture on a water bath for not less than one hour and fifteen minutes, or until effervescence ceases; then boil the liquid, filter it through paper, and, having rinsed the flask and iron wire with a little hot distilled water, pass the rinsings through the filter. To the filtered liquid add *two hundred and twenty grammes* of hydrochloric acid, then add the mixture slowly and gradually in a stream to *sixty-five grammes* of nitric acid contained in a tared, capacious porcelain vessel, and warm gently. If the solution has acquired a black color, continue the addition of nitric acid, drop by drop, until red fumes are no longer evolved and the solution assumes a clear, reddish-brown color. After effervescence ceases, heat on a sand bath, stirring occasionally until the liquid is free from nitric acid, as indicated by the test given below. During the heating add distilled water from time to time to maintain about the original volume. Finally add the remaining *forty grammes* of hydrochloric acid and enough distilled water to make the Solution weigh *one thousand grammes*.

Solution of Ferric Chloride is a reddish-brown liquid, having a faint odor of hydrochloric acid, an acid, strongly styptic taste, and an acid reaction.

Specific gravity: from 1.29 to 1.32 at 25° C.

Separate portions of an aqueous dilution of the Solution (1 in 10) yield a brownish-red precipitate with ammonia water, a blue precipitate with potassium ferrocyanide T.S., and a white precipitate, insoluble in nitric acid, with silver nitrate T.S.

Precipitate the iron completely from a weighed portion of about 2 mils of the Solution, previously diluted with 50 mils of distilled water, by adding an excess of ammonia water and filter. The filtrate is colorless, and does not yield a precipitate with hydrogen sulphide T.S. (*zinc, lead or copper*); nor does it leave on evaporation and ignition a fixed residue corresponding to more than 0.1 per cent. of the amount taken (*salts of the fixed alkalies*).

Add a clear crystal of ferrous sulphate to a cooled mixture of equal volumes of sulphuric acid and an aqueous dilution of the Solution (1 in 10); the crystal does not become brown nor does a brownish-black color develop around it (*nitric acid*).

Add a few drops of freshly prepared potassium ferricyanide T.S. to an aqueous dilution of the Solution (about 1 in 20); a brown color is produced which does not at once turn green or greenish-blue (*ferrous salts*).

To about 0.5 Gm. of Solution of Ferric Chloride, accurately weighed, add 10 mils of distilled water and 50 mils of tenth-normal silver nitrate V.S., shake it vigorously, then add 2 mils of nitric acid and sufficient distilled water to measure exactly 100 mils, and mix well. Filter the mixture through a dry filter (rejecting the first filtrate) and determine the excess of silver nitrate in 50 mils of the filtrate by titration with tenth-normal potassium sulphocyanate V.S. The percentage of chlorine found is not less than 3 per cent. nor more than 5 per cent. in excess of that required to combine with the iron present as ferric chloride. The percentage of iron found, multiplied by 1.9, gives the percentage of chlorine combined as ferric chloride (*free hydrochloric acid*). Each mil of tenth-normal silver nitrate V.S. corresponds to 0.003546 Gm. of Cl.

Assay—Transfer about 2 Gm. of Solution of Ferric Chloride to a flask, stopper and weigh accurately, then add 5 mils of hydrochloric acid, 25 mils of distilled water and about 3 Gm. of potassium iodide, securely stopper the flask and allow the mixture to stand for thirty minutes at a temperature of 40° C. Cool the liquid, dilute it with 100 mils of distilled water and then titrate with tenth-normal sodium thiosulphate V.S., starch T.S. being used as indicator. It shows not less than 10 per cent. nor more than 11 per cent. of Fe.

Each mil of tenth-normal sodium thiosulphate V.S. used corresponds to 0.005584 Gm. of Fe. Each gramme of Solution of Ferric Chloride corresponds to not less than 17.9 mils nor more than 19.7 mils of tenth-normal sodium thiosulphate V.S.

Preparations—Ferri Chloridum Tinctura Ferri Chloridi.

Average dose—Metric, 0.1 mil—Apothecaries, 1½ minims.

LIQUOR FERRI ET AMMONII ACETATIS

Solution of Iron and Ammonium Acetate

Liq. Ferr. et Ammon. Acet.—Basham's Mixture

Tincture of Ferric Chloride, *forty milliliters*	40 mils
Diluted Acetic Acid, *sixty milliliters*	60 mils
Solution of Ammonium Acetate, *five hundred milliliters*	500 mils
Aromatic Elixir, *one hundred and twenty milliliters*	120 mils
Glycerin, *one hundred and twenty milliliters*	120 mils
Distilled Water, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

To the solution of ammonium acetate (which must be slightly acid) add, successively, the diluted acetic acid, the tincture of ferric chloride, the aromatic elixir, and the glycerin, and lastly, enough distilled water to make the product measure *one thousand mils.*

This preparation must not be dispensed unless it has been recently prepared.

Solution of Iron and Ammonium Acetate is a clear, reddish-brown liquid, of a sweetish, saline and afterward slightly astringent taste; it possesses an aromatic odor.

The Solution is acid to litmus.

Specific gravity: about 1.039 at 25° C.

The Solution yields a blue precipitate with potassium ferrocyanide T.S., but the addition of ammonia water produces no precipitate.

When Solution of Iron and Ammonium Acetate is heated with potassium hydroxide T.S., ammonia is evolved.

Add 1 mil each of sulphuric acid and alcohol to 5 mils of the Solution and boil the mixture; ethyl acetate is formed, recognizable by its odor.

Average dose—Metric, 15 mils—Apothecaries, 4 fluidrachms.

LIQUOR FERRI SUBSULPHATIS

Solution of Ferric Subsulphate

Liq. Ferr. Subsulph.—Monsel's Solution Solution of Basic Ferric Sulphate

An aqueous solution containing basic ferric sulphate corresponding to not less than 13 per cent. nor more than 14 per cent. of Fe.

Ferrous Sulphate, *six hundred and seventy-five grammes*	675 Gm.
Sulphuric Acid, *sixty-five grammes*	65 Gm.
Nitric Acid,	
Distilled Water, each, *a sufficient quantity,*	
To make *one thousand grammes*	1000 Gm.

Add the sulphuric acid to *five hundred mils* of distilled water in a tared, capacious porcelain dish, heat the mixture to nearly 100° C. then add *seventy grammes* of nitric acid and mix well. Divide the ferrous sulphate, coarsely powdered, into four approximately equal portions, and add these portions one at a time to the hot liquid, stirring after each addition until effervescence ceases. If, after the ferrous sulphate has dissolved, the solution is of a black color, add nitric acid, a few drops at a time, with heating and stirring, until red fumes cease to be evolved. Boil the Solution until it assumes a red color and is free from nitric acid, as indicated by the test given below. During the heating add distilled water from time to time to maintain about the original volume. Lastly, add enough distilled water to make the product weigh *one thousand grammes.* Filter if necessary. Keep it in well-stoppered containers, in a moderately warm place (not under 22° C.), protected from light.

This Solution sometimes crystallizes, forming a semi-solid, whitish mass. When this occurs, the application of a gentle heat will restore the liquid condition.

Solution of Ferric Subsulphate is a dark reddish-brown liquid, odorless or nearly so, of an acid, strongly styptic taste, an acid reaction and miscible with water and alcohol without decomposition.

Specific gravity: about 1.548 at 25° C.

Separate portions of an aqueous dilution of the Solution (1 in 20) yield a brownish-red precipitate with ammonia water, a blue precipitate with potassium ferrocyanide T.S., and a white precipitate, insoluble in hydrochloric acid, with barium chloride T.S.

Add a clear crystal of ferrous sulphate to a cooled mixture of equal volumes of sulphuric acid and an aqueous dilution of the Solution (1 in 10); the crystal does not become brown nor does a brownish-black color develop around it (*nitric acid*).

Add a few drops of freshly prepared potassium ferricyanide T.S. to 2 mils of an aqueous dilution of the Solution (1 in 20); a brown color is produced without a tinge of green or greenish-blue (*ferrous salt*).

Assay —Transfer about 1.5 Gm. of Solution of Ferric Subsulphate to a flask, stopper and weigh accurately, then add 5 mils of hydrochloric acid, 25 mils of distilled water, and 2 Gm. of potassium iodide, securely stopper the flask and allow the mixture to stand for thirty minutes at a temperature of 40° C. Cool the liquid, dilute it with 50 mils of distilled water, and then titrate with tenth-normal sodium thiosulphate V.S., starch T.S. being used as indicator. It shows not less than 13 per cent. nor more than 14 per cent. of Fe.

Each mil of tenth-normal sodium thiosulphate V.S. used corresponds to 0.005584 Gm. of Fe. Each gramme of Solution of Ferric Subsulphate corresponds to not less than 23.3 mils nor more than 25.1 mils of tenth-normal sodium thiosulphate V.S.

Average dose—Metric, 0.2 mil—Apothecaries, 3 minims.

LIQUOR FERRI TERSULPHATIS

Solution of Ferric Sulphate

Liq. Ferr. Tersulph.—Solution of Iron Tersulphate

An aqueous solution containing normal ferric sulphate [$Fe_2(SO_4)_3$ = 399.89], corresponding to not less than 9.5 per cent. nor more than 10.5 per cent. of Fe.

Ferrous Sulphate, *five hundred grammes*	500 Gm.
Sulphuric Acid, *ninety-six grammes*	96 Gm.
Nitric Acid,	
Distilled Water, each, *a sufficient quantity*,	
To make *one thousand grammes*	1000 Gm.

Add the sulphuric acid to about *two hundred and fifty mils* of distilled water in a tared, capacious porcelain dish, heat the mixture to nearly 100° C., then add *fifty-six grammes* of nitric acid, and mix well. Divide the ferrous sulphate, coarsely powdered, into four approximately equal portions, and add these portions one at a time to the hot liquid, stirring after each addition until effervescence ceases. When all of the ferrous sulphate is dissolved, if the Solution has acquired a black color, add nitric acid, a few drops at a time, heating and stirring until red fumes cease to be evolved, and the Solution assumes a clear reddish-brown color; then boil the liquid until it is free from nitric acid, as indicated by the test given below. During the heating add distilled water from time to time to maintain about the original volume. Lastly, add enough distilled water to make the product weigh *one thousand grammes*. Filter if necessary.

Solution of Ferric Sulphate is a yellowish-brown liquid, almost odorless, having an acid, strongly styptic taste, and an acid reaction; it is miscible with water and alcohol.

Specific gravity: about 1.432 at 25° C.

Separate portions of an aqueous dilution of the Solution (1 in 20) yield a brownish-red precipitate with ammonia water, a blue precipitate with potassium ferrocyanide T.S., and a white precipitate, insoluble in hydrochloric acid, with barium chloride T.S.

Add a clear crystal of ferrous sulphate to a cooled mixture of equal volumes of sulphuric acid and an aqueous dilution of the Solution (1 in 10); the crystal does not become brown, nor does a brownish-black color develop around it (*nitric acid*).

Add a few drops of freshly prepared potassium ferricyanide T.S. to 2 mils of an aqueous dilution of the Solution (1 in 20); a brown color is produced without a tinge of green or greenish-blue (*ferrous salt*).

Assay—Transfer about 1.5 Gm. of Solution of Ferric Sulphate to a flask, stopper and weigh accurately, then add 5 mils of hydrochloric acid, 25 mils of distilled water, and 2 Gm. of potassium iodide, securely stopper the flask and allow the mixture to stand for thirty minutes at a temperature of 40° C. Cool the liquid, dilute it with 50 mils of distilled water and then titrate with tenth-normal sodium thiosulphate V.S., starch T.S. being used as indicator. It shows not less than 9.5 per cent. nor more than 10.5 per cent. of Fe.

Each mil of tenth-normal sodium thiosulphate V.S. used corresponds to 0.005584 Gm. of Fe. Each gramme of Solution of Ferric Sulphate corresponds to not less than 17 mils nor more than 18.8 mils of tenth-normal sodium thiosulphate V.S.

LIQUOR FORMALDEHYDI

Solution of Formaldehyde

Liq. Formaldehyd.

An aqueous solution containing not less than 37 per cent. by weight of CH_2O or $H.CHO$ (30.02), with varying amounts of methyl alcohol to prevent polymerization. Preserve it in a moderately warm place, protected from light.

Solution of Formaldehyde is a clear, colorless or nearly colorless liquid, having a pungent odor and a caustic taste; its vapor acts as an irritant upon mucous membrane.

It is miscible with water or alcohol. On long standing, especially in the cold, Solution of Formaldehyde sometimes loses its transparency, the cloudiness being due to the separation of paraformaldehyde.

Dilute 5 mils of Solution of Formaldehyde with 25 mils of distilled water and add 3 mils of silver ammonium nitrate T.S.; metallic silver is produced either in the form of a finely divided gray precipitate or as a bright metallic mirror adhering to the sides of the test tube.

Add 2 drops of Solution of Formaldehyde to 5 mils of sulphuric acid in which a little salicylic acid has been dissolved, and warm the liquid very gently; a permanent deep red color appears.

Not more than 1 mil of normal potassium hydroxide V.S. is required to neutralize 20 mils of Solution of Formaldehyde, to which 2 drops of phenolphthalein T.S. have been added (*free acids*).

Assay—Transfer 3 mils of Solution of Formaldehyde to a tared flask containing 10 mils of distilled water, tightly stopper and weigh accurately. Add to the contents of the flask 50 mils of normal potassium hydroxide V.S., and follow this immediately but slowly through a small funnel with 50 mils of solution of hydrogen dioxide which has previously been rendered neutral to litmus with potassium hydroxide. Now heat the mixture cautiously on a water bath for five minutes, shaking occasionally during this time; allow the mixture to cool, rinse the funnel and sides of the flask with distilled water and, after allowing it to stand thirty minutes, titrate with normal sulphuric acid V.S., using litmus T.S. as indicator. It shows not less than 37 per cent. of CH_2O, correction being made for free acid if present.

Each mil of normal potassium hydroxide V.S. corresponds to 0.03002 Gm. of CH_2O. Each gramme of Solution of Formaldehyde corresponds to not less than 12.3 mils of normal potassium hydroxide V.S.

LIQUOR HYDROGENII DIOXIDI

Solution of Hydrogen Dioxide

Liq. Hydrog. Diox.—Aqua Hydrogenii Dioxidi, U.S.P. VIII Solution of Hydrogen Peroxide

An aqueous solution containing not less than 3 per cent. by weight of H_2O_2 (34.02), corresponding to not less than 10 volumes of available oxygen. Preserve it in a cool place protected from light. Upon removing the stopper from the bottle, not more than a slight pressure should be observed.

Solution of Hydrogen Dioxide is a colorless liquid, odorless or having an odor suggesting ozone, slightly acid to the taste and producing a peculiar sensation and froth in the mouth; prone to deteriorate upon keeping or upon protracted agitation, and rapidly decomposed by contact with many oxidizing as well as reducing substances. If the stopper of the bottle is coated with paraffin or replaced by a pledget of purified cotton, deterioration is retarded.

When exposed to the air at the ordinary temperature or when heated on a water bath at a temperature not exceeding 60° C., the solution loses chiefly water. When rapidly heated, it frequently decomposes suddenly.

Solution of Hydrogen Dioxide is acid to litmus.

Shake 1 mil of Solution of Hydrogen Dioxide with 10 mils of distilled water containing 1 drop of diluted sulphuric acid, and add 2 mils of ether. The subsequent addition of a drop of potassium dichromate T.S. produces a blue color in the aqueous layer. Upon agitation, this blue color passes into the ethereal layer.

Not more than 0.03 Gm. of solid residue remains on evaporating 20 mils of the Solution to dryness on a water bath (*non-volatile matter*).

It requires not more than 2 mils of tenth-normal potassium hydroxide V.S., phenolphthalein T.S. being used as indicator, to neutralize 25 mils of Solution of Hydrogen Dioxide (*free acid*).

Add 1 mil of ammonia water to 1 mil of the Solution and evaporate the liquid to dryness on a water bath; the residue meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Evaporate 1 mil of the Solution to dryness on a water bath and dissolve the residue in 10 mils of distilled water containing 1 mil of diluted hydrochloric acid; the liquid does not respond to the Test for heavy metals (see Part II, Test No. 3).

Evaporate 50 mils of the Solution, previously rendered alkaline by the addition of sodium hydroxide T.S., to dryness on a water bath and transfer the dry residue to a platinum crucible. Moisten the residue with sulphuric acid, and cover the crucible with a watch glass, the convex side of which is coated with a thin layer of wax which is afterwards scratched so as to expose the glass. Cool the watch glass by placing water in the concave side and standing in this a small beaker which must be kept filled with cold water. Now heat the crucible and contents on a water bath for one hour; the surface of the watch glass after being cleaned shows no sign of corrosion (*hydrofluoric acid*).

The addition of 2 drops of diluted sulphuric acid to 10 mils of the Solution produces no turbidity or precipitate within ten minutes (*barium*).

Add 4 drops of sodium acetate T.S. to 10 mils of the Solution and follow with 4 drops of calcium chloride T.S.; no turbidity or precipitate is produced within ten minutes (*oxalic acid*).

Shake out 100 mils of Solution of Hydrogen Dioxide in a separator with a mixture of three volumes of chloroform and two volumes of ether, using 50 mils, 25 mils, and 25 mils respectively, and evaporate the combined solutions to dryness at room temperature in a tared glass dish. A residue may be obtained which weighs not more than 0.04 Gm. (*limit of preservative*).

Assay—Dilute about 2 Gm. of Solution of Hydrogen Dioxide, accurately weighed, with 20 mils of distilled water, then acidulate it with 20 mils of diluted sulphuric acid and titrate with tenth-normal potassium permanganate V.S. It shows not less than 3 per cent. of H_2O_2.

Each mil of tenth-normal potassium permanganate V.S. used corresponds to 0.0017008 Gm. of H_2O_2, or to 0.0008 Gm. of oxygen. Each gramme of Solution of Hydrogen Dioxide corresponds to not less than 17.6 mils of tenth-normal potassium permanganate V.S.

Average dose—Metric, 4 mils—Apothecaries, 1 fluidrachm.

LIQUOR HYPOPHYSIS

Solution of Hypophysis

Liq. Hypophysis—Solution of the Pituitary Body

A solution containing the water-soluble principle or principles from the fresh posterior lobe of the pituitary body of cattle.

Extract the finely minced material with slightly acidulated water, boil the solution for ten minutes and filter it. Sterilize this filtrate and preserve it in a sterile condition in glass containers.

A transparent liquid, colorless or nearly so, having a faint, characteristic odor.

One mil of Solution of Hypophysis, diluted 20,000 times, has the same activity on the isolated uterus of the virgin guinea-pig as a 1 to 20,000,000 solution of beta-iminazolyl-ethylamine hydrochloride when tested as directed by the United States Hygienic Laboratory.

Average dose—Metric, 1 mil—Apothecaries, 15 minims.

LIQUOR IODI COMPOSITUS

Compound Solution of Iodine

Liq. Iodi Co.—Lugol's Solution

An aqueous solution containing not less than 4.8 per cent. nor more than 5.2 per cent. of I and not less than 9.8 per cent. nor more than

10.2 per cent. of KI. Preserve the solution in glass-stoppered bottles, protected from light.

IODINE, *five grammes*	5 Gm.
POTASSIUM IODIDE, *ten grammes*	10 Gm.
DISTILLED WATER, *a sufficient quantity,*	
To make *one hundred grammes*	100 Gm.

Dissolve the iodine and potassium iodide in a sufficient quantity of distilled water to make the product weigh *one hundred grammes.*

Compound Solution of Iodine is a transparent liquid of a deep brown color, having an odor of iodine.

A drop of Compound Solution of Iodine when added to 1 mil of starch T.S., diluted with 10 mils of water, produces a deep blue color.

Assay for Potassium Iodide—Evaporate in a tared, porcelain dish on a water bath about 5 mils of Compound Solution of Iodine, accurately weighed in a stoppered weighing-bottle, repeatedly moisten the residue with distilled water and re-evaporate until it becomes white. It leaves a residue of not less than 9.8 per cent. nor more than 10.2 per cent. of a salt which responds to the tests for identity and purity under *Potassii Iodidum.*

Assay for Iodine—Dilute about 10 mils of Compound Solution of Iodine, accurately weighed in a stoppered weighing-bottle, with 25 mils of distilled water and titrate with tenth-normal sodium thiosulphate V.S., starch T.S. being used as indicator. It shows not less than 4.8 per cent. nor more than 5.2 per cent. of I.

Each mil of tenth-normal sodium thiosulphate V.S. used corresponds to 0.012692 Gm. of I. Each gramme of Compound Solution of Iodine corresponds to not less than 3.8 mils nor more than 4.1 mils of tenth-normal sodium thiosulphate V.S.

AVERAGE DOSE—Metric, 0.2 mil—Apothecaries, 3 minims.

LIQUOR MAGNESII CITRATIS

Solution of Magnesium Citrate

Liq. Mag. Cit.

One hundred mils of the Solution contains magnesium citrate corresponding to not less than 1.5 Gm. of magnesium oxide ($MgO = 40.32$).

MAGNESIUM CARBONATE, *fifteen grammes*	15.0 Gm.
CITRIC ACID, *thirty-three grammes*	33.0 Gm.
SYRUP, *sixty milliliters*	60.0 mils
PURIFIED TALC, *five grammes*	5.0 Gm.
OIL OF LEMON, *one-tenth of a milliliter*	0.1 mil
POTASSIUM BICARBONATE, *two and five-tenths grammes*	2.5 Gm.
WATER, *a sufficient quantity.*	

Dissolve the citric acid in *one hundred and fifty mils* of hot water in a suitable dish, and, having added the magnesium carbonate, previously mixed with *one hundred mils* of water, stir until it is dissolved. Then add the syrup, heat the mixed liquids to the boiling point, immediately introduce the oil of lemon, previously triturated with the purified talc, and filter the mixture, while hot, into a strong bottle (previously rinsed with boiling water) of suitable capacity. Introduce enough boiled water to make the product measure *three hundred and fifty mils.* Stopper it with purified cotton until cold, then drop in the potassium bicarbonate, and immediately stopper the bottle securely. Lastly, shake the solution occasionally until the potassium bicarbonate is dissolved. Keep the bottle on its side in a cool place, preferably in a refrigerator.

Note—In this process the 2.5 Gm. of potassium bicarbonate may be replaced by 2.1 Gm. of sodium bicarbonate, preferably in tablet form.

Add 1 mil of glacial acetic acid and 3 mils of an aqueous solution of potassium acetate (1 in 2) to 10 mils of Solution of Magnesium Citrate, shake the mixture vigorously, then gently rub the sides of the test tube with a glass rod for a few minutes and allow to stand for one hour; no white crystalline precipitate, soluble in ammonia water, is produced (*tartaric acid*).

Dilute 2 mils of the Solution with 8 mils of distilled water and add 5 drops of hydrochloric acid and 1 mil of barium chloride T.S.; no turbidity is produced within one minute (*sulphate*).

Dilute 2 mils of the Solution with 8 mils of distilled water and add 5 mils of ammonium oxalate T.S.; not more than a slight turbidity is produced (*calcium*).

Assay—Transfer 10 mils of Solution of Magnesium Citrate, accurately measured, to a platinum or porcelain dish, evaporate to dryness, and ignite until most of the carbonaceous matter has burned off. Add to the residue 20 mils of diluted hydrochloric acid, heat on a water bath for fifteen minutes, filter if necessary, and wash the residue thoroughly with hot water. To the combined filtrate and washings, which should measure about 100 mils, add an excess of sodium phosphate T.S. (about 20 mils), then add ammonia water gradually, with constant stirring, until slightly alkaline, allow to stand for ten minutes, add 30 mils of ammonia water, and allow to stand for twelve hours. Collect the precipitate on a filter, wash it with dilute ammonia water (1 volume of ammonia water to 3 volumes of water) until 10 mils of the washings, when acidulated with nitric acid, yield not more than an opalescence on the addition of a few drops of silver nitrate T.S. Dry, and ignite to constant weight. The weight of the magnesium pyrophosphate so obtained is not less than 0.414 Gm., indicating an equivalent of not less than 1.5 Gm. of magnesium oxide in 100 mils of the Solution.

Average dose—Metric, 350 mils—Apothecaries, 12 fluidounces.

LIQUOR PLUMBI SUBACETATIS

Solution of Lead Subacetate

Liq. Plumb. Subacet.—Goulard's Extract

An aqueous solution containing lead subacetate, approximately $Pb_2O(CH_3.COO)_2 = 548.25$, corresponding to not less than 18 per cent. of Pb. Preserve the Solution in well-stoppered bottles.

Lead Acetate, *one hundred and eighty grammes*	180 Gm
Lead Oxide, finely powdered, *one hundred and ten grammes*	110 Gm.
Distilled Water, *a sufficient quantity,*	
To make *one thousand grammes*	1000 Gm.

Dissolve the lead acetate in *seven hundred mils* of boiling distilled water and add the solution slowly and in portions to the lead oxide, which has previously been rubbed to a smooth paste with *one hundred mils* of distilled water, and place in a porcelain dish of about *one liter* capacity. Boil this mixture during half an hour with occasional stirring, adding distilled water as required to maintain about the original volume. Finally, when cool, filter the solution, protecting it as much as possible from the air, and add sufficient distilled water, which has previously been boiled and cooled, to make the finished product weigh *one thousand grammes.*

A clear, colorless liquid, odorless and having a very sweet, astringent taste. It is alkaline to litmus but not to phenolphthalein. On exposure to the air it absorbs carbon dioxide, which causes the formation of a white precipitate.

Specific gravity: about 1.245 at 25° C.

When Solution of Lead Subacetate is added to a solution of acacia, it produces a dense, white precipitate (distinction from *normal lead acetate*).

Separate portions of Solution of Lead Subacetate, diluted with 10 volumes of recently boiled distilled water, yield a black precipitate with hydrogen sulphide T.S., a yellow precipitate with potassium iodide T.S., and a white precipitate with diluted sulphuric acid.

Solution of Lead Subacetate yields with potassium ferrocyanide T.S. a precipitate which is not perceptibly blue or red (*iron or copper*).

Assay—Transfer about 1.5 Gm. of Solution of Lead Subacetate, accurately weighed, to a 200 mil measuring flask, dilute with 50 mils of recently boiled distilled water, then add 50 mils of tenth-normal oxalic acid V.S., agitate the mixture thoroughly for five minutes, fill to the mark with distilled water, and filter, rejecting the first 20 mils of the filtrate. Add 5 mils of sulphuric acid to 100 mils of the filtrate (representing one-half of the amount of Solution of Lead Subacetate originally taken), warm to about 70° C. and titrate with tenth-normal potassium permanganate V.S. It shows not less than 18 per cent. of Pb.

Each mil of tenth-normal oxalic acid V.S. used corresponds to 0.010355 Gm. of Pb. Each gramme of Solution of Lead Subacetate corresponds to not less than 17.4 mils of tenth-normal oxalic acid V.S.

Preparation—Liquor Plumbi Subacetatis Dilutus.

LIQUOR PLUMBI SUBACETATIS DILUTUS

Diluted Solution of Lead Subacetate

Liq. Plumb. Subacet. Dil.—Lead Water

SOLUTION OF LEAD SUBACETATE, *forty grammes*	40 Gm.
DISTILLED WATER, *a sufficient quantity*,	
To make *one thousand grammes*	1000 Gm.

Mix the solution of lead subacetate with enough distilled water, previously boiled and cooled, to make the product weigh *one thousand grammes.* This preparation must be preserved in small, well-filled and tightly-stoppered bottles.

LIQUOR POTASSII ARSENITIS

Solution of Potassium Arsenite

Liq. Pot. Arsen.—Fowler's Solution Liquor arsenicalis Fowleri P.I.

An aqueous solution containing potassium arsenite, corresponding in amount to not less than 0.975 per cent. nor more than 1.025 per cent. of As_2O_3 (197.92). Preserve the Solution in amber-colored bottles.

Arsenic Trioxide, in fine powder, *ten grammes*	10 Gm.
Potassium Bicarbonate, *twenty grammes*	20 Gm.
Compound Tincture of Lavender, *thirty grammes*	30 Gm.
Distilled Water, *a sufficient quantity,*	
To make *one thousand grammes*	1000 Gm.

Boil the arsenic trioxide and potassium bicarbonate in a tared flask with *one hundred grammes* of distilled water, until solution has been effected, and then add enough distilled water to make the solution weigh *nine hundred and seventy grammes*; then add the compound tincture of lavender and filter through paper.

Solution of Potassium Arsenite is a clear or faintly opalescent liquid with a pink color and a slight odor of lavender. It is alkaline to litmus.

Acidulate strongly 10 mils of the Solution with hydrochloric acid and add an equal volume of hydrogen sulphide T.S.; a yellow precipitate is produced which dissolves in ammonium carbonate T.S.

Acidulate 4 mils of Solution of Potassium Arsenite with diluted nitric acid, add 1 mil of silver nitrate T.S. and superimpose a layer of ammonia water upon this liquid; no red or reddish-brown color is observed at the line of contact (*arsenate*).

Assay—Dilute about 20 mils of Solution of Potassium Arsenite, accurately weighed, with 75 mils of distilled water, acidify the mixture very slightly with diluted hydrochloric acid, then dissolve in the solution 2 Gm. of sodium bicarbonate and titrate the resulting liquid with tenth-normal iodine V.S., starch T.S. being used as indicator. It shows not less than 0.975 per cent. nor more than 1.025 per cent. of As_2O_3.

Each mil of tenth-normal iodine V.S. used corresponds to 0.004948 Gm. of As_2O_3. Each gramme of Solution of Potassium Arsenite corresponds to not less than 1.97 nor more than 2.07 mils of tenth-normal iodine V.S.

Average dose—Metric, 0.2 mil—Apothecaries, 3 minims.

LIQUOR POTASSII CITRATIS

Solution of Potassium Citrate

Liq. Pot. Cit.

An aqueous solution containing not less than 8 per cent. of $K_3C_6H_5O_7$ (306.34), with small amounts of citric and carbonic acids.

Potassium Bicarbonate, *eight grammes*	8 Gm.
Citric Acid, *six grammes*	6 Gm.
Distilled Water, *a sufficient quantity,*	
To make *one hundred milliliters*	100 mils

Dissolve the potassium bicarbonate and the citric acid, each, in *forty mils* of distilled water. Filter the solutions separately, and wash the filters with enough distilled water to obtain in each case *fifty mils.* Mix the two solutions, and, when effervescence has ceased, transfer to a bottle and stopper tightly. This preparation must not be dispensed unless it has been recently prepared.

Solution of Potassium Citrate is a clear, colorless liquid, odorless, and having a mildly saline taste. It is slightly acid to litmus.

It conforms to the reactions and tests for an aqueous solution of the salt as given under *Potassii Citras,* when concentrated to the proper strength.

Assay—Evaporate to dryness about 15 mils of Solution of Potassium Citrate, accurately weighed, and proceed as directed under the Assay for alkali salts of organic acids (see Part II, Test No. 6). It shows not less than 8 per cent. of $K_3C_6H_5O_7$.

Each mil of half-normal sulphuric acid V.S. used corresponds to 0.051057 Gm. of $K_3C_6H_5O_7$. Each gramme of Solution of Potassium Citrate, after evaporation and ignition, corresponds to not less than 1.57 mils of half-normal sulphuric acid V.S.

Average dose—Metric, 15 mils—Apothecaries, 4 fluidrachms.

LIQUOR POTASSII HYDROXIDI

Solution of Potassium Hydroxide

Liq. Pot. Hydrox.—Liquor Potassæ Solution of Potassa

An aqueous solution containing not less than 4.5 per cent. of KOH (56.11). Preserve Solution of Potassium Hydroxide in bottles made of hard glass, and provided with rubber stoppers or with glass stoppers coated with petrolatum.

Potassium Hydroxide, *sixty grammes*	60 Gm.
Distilled Water, *nine hundred and forty grammes*	940 Gm.
To make *one thousand grammes*	1000 Gm.

Dissolve the potassium hydroxide in the distilled water.

Solution of Potassium Hydroxide is a clear, colorless, odorless liquid, having, even when diluted, a very acrid and caustic taste. *It should not be tasted unless largely diluted.* It is strongly alkaline and readily absorbs carbon dioxide from the air.

Specific gravity: about 1.046 at 25° C.

It conforms to the reactions and tests for an aqueous solution of potassium hydroxide as given under *Potassii Hydroxidum,* when concentrated to the proper strength.

Introduce about 20 mils of Solution of Potassium Hydroxide into a flask, stopper, weigh accurately and titrate it directly with normal hydrochloric acid V.S., using methyl orange T.S. as indicator. It shows not more than 5.5 per cent. of alkalinity, calculated as KOH (*carbonate*).

Assay—Transfer about 50 mils of Solution of Potassium Hydroxide, accurately weighed, to a 250 mil measuring flask, add 20 mils of barium chloride T.S. and fill the flask to the mark with distilled water, which has previously been boiled and cooled. Then thoroughly agitate the liquid, filter it through a dry filter, reject the first 20 mils and titrate 100 mils of the filtrate, representing 20 mils of the solution, with normal hydrochloric acid V.S., using phenolphthalein T.S. as indicator. It shows not less than 4.5 per cent. of KOH, when calculated to the amount of Solution originally taken.

Each mil of normal hydrochloric acid V.S. used corresponds to 0.05611 Gm. of KOH. Each gramme of Solution of Potassium Hydroxide (after treatment with barium chloride T.S.) corresponds to not less than 0.80 mil of normal hydrochloric acid V.S.

AVERAGE DOSE—Metric, 1 mil—Apothecaries, 15 minims.

LIQUOR SODÆ CHLORINATÆ

Solution of Chlorinated Soda

Liq. Sod. Chlorinat.—Labarraque's Solution

An aqueous solution of chlorine compounds of sodium, containing not less than 2.5 per cent. of available Cl. Preserve the Solution in well-stoppered bottles, in a cool place, protected from light.

MONOHYDRATED SODIUM CARBONATE, *seventy grammes* . . .	70 Gm.
CHLORINATED LIME, *one hundred grammes*	100 Gm.
WATER, *a sufficient quantity,*	
To make *one thousand grammes*	1000 Gm.

Triturate the chlorinated lime with *five hundred mils* of water gradually added until a uniform mixture results. Dissolve the monohydrated sodium carbonate in *five hundred mils* of hot water, and add this solution to the chlorinated lime mixture contained in a suitable vessel. Stir or shake the mixture thoroughly and if it becomes gelatinous warm the vessel very gently until its contents again liquefy. Then transfer the mixture to a wetted muslin strainer, returning the first portion until the liquid passes through clear, and when no more liquid drains from it, wash the precipitate with enough water to make the product weigh *one thousand grammes.*

Solution of Chlorinated Soda is a clear, pale greenish liquid, having a faint odor of chlorine and a disagreeable, alkaline taste.

The Solution at first colors red litmus paper blue, and then bleaches it.

The addition of hydrochloric acid to the Solution causes an evolution of chlorine and carbon dioxide.

Assay—Mix in a flask about 7 mils of Solution of Chlorinated Soda, accurately weighed, with 50 mils of distilled water, add 1 Gm. of potassium iodide and 5 mils of acetic acid and titrate with tenth-normal sodium thiosulphate V.S., starch T.S. being used as indicator. It shows not less than 2.5 per cent. of available Cl.

Each mil of tenth-normal sodium thiosulphate V.S. used corresponds to 0.003546 Gm. of available Cl. Each gramme of Solution of Chlorinated Soda corresponds to not less than 7 mils of tenth-normal sodium thiosulphate V.S.

LIQUOR SODII ARSENATIS

Solution of Sodium Arsenate

Liq. Sod. Arsen.

An aqueous solution containing not less than 0.975 per cent. nor more than 1.025 per cent. of Na_2HAsO_4 (185.97).

Exsiccated Sodium Arsenate, previously dried to constant weight at 150° C., *one gramme*	1 Gm.
Distilled Water, *a sufficient quantity,*	
To make *one hundred grammes*	100 Gm.

Dissolve the exsiccated sodium arsenate in sufficient distilled water to make the product weigh *one hundred grammes.*

The Solution conforms to the reactions and tests for an aqueous solution of the salt as given under *Sodii Arsenas Exsiccatus,* when concentrated to proper strength.

Assay—Pour into a tared flask about 30 mils of Solution of Sodium Arsenate, weigh accurately, heat to 80° C. and add 10 mils of hydrochloric acid and 3 Gm. of potassium iodide. Allow the mixture to stand for fifteen minutes at 80° C., in a glass-stoppered flask, cool and then titrate with tenth-normal sodium thiosulphate V.S., starch T.S. being used as indicator. It shows not less than 0.975 per cent. nor more than 1.025 per cent. of Na_2HAsO_4.

Each mil of tenth-normal sodium thiosulphate V.S. used corresponds to 0.0092985 Gm. of Na_2HAsO_4. Each gramme of Solution of Sodium Arsenate corresponds to not less than 1.05 mils nor more than 1.10 mils of tenth-normal sodium thiosulphate V.S.

Average dose—Metric, 0.2 mil—Apothecaries, 3 minims.

LIQUOR SODII CHLORIDI PHYSIOLOGICUS

Physiological Solution of Sodium Chloride

Liq. Sod. Chlor. Physio.—Physiological Salt Solution Normal Salt Solution

Sodium Chloride, *eight and five-tenths grammes*	8.5 Gm.
Distilled Water, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Dissolve the sodium chloride in sufficient freshly distilled water to measure *one thousand mils* and filter. Then sterilize the solution, preferably in an autoclave, under steam pressure, at a temperature of from 115° to 120° C. for fifteen minutes, or by boiling it during at least one hour, and preserve it in a sterile condition. This solution should not be used after it has been made forty-eight hours.

LIQUOR SODII GLYCEROPHOSPHATIS

Solution of Sodium Glycerophosphate

Liq. Sod. Glycerophos.—Solution of Sodium Glycerinophosphate

An aqueous solution of sodium glycerophosphate containing not less than 50 per cent. of the anhydrous salt ($Na_2C_3H_7PO_6$ or $Na_2C_3H_5(OH)_2PO_4=216.10$).

A clear, colorless or yellowish, syrupy liquid. In other respects it conforms to the reactions and tests for purity under *Sodii Glycerophosphas.*

Assay—Proceed as directed under *Sodii Glycerophosphas.* It shows not less than 50 per cent. of $Na_2C_3H_7PO_6$.

Each mil of half-normal hydrochloric acid V.S. used corresponds to 0.10805 Gm. of $Na_2C_3H_7PO_6$.

Each gramme of Solution of Sodium Glycerophosphate corresponds to not less than 4.63 mils of half-normal hydrochloric acid V.S.

Average dose—Metric, 0.35 mil—Apothecaries, 6 minims.

LIQUOR SODII HYDROXIDI

Solution of Sodium Hydroxide

Liq. Sod. Hydrox.—Liquor Sodæ Solution of Soda

An aqueous solution containing not less than 4.5 per cent. of NaOH (40.01). Preserve Solution of Sodium Hydroxide in bottles made of hard glass and provided with rubber stoppers or with glass stoppers coated with petrolatum.

Sodium Hydroxide, *fifty-six grammes*	56 Gm.
Distilled Water, *nine hundred and forty-four grammes*	944 Gm.
To make *one thousand grammes*	1000 Gm.

Dissolve the sodium hydroxide in the distilled water.

Solution of Sodium Hydroxide is a clear, colorless, odorless liquid, having, when diluted, a very acrid and caustic taste. *It should not be tasted unless largely diluted.* It is strongly alkaline and readily absorbs carbon dioxide from the air.

Specific gravity: about 1.056 at 25° C.

It conforms to the reactions and tests for an aqueous solution of sodium hydroxide as given under *Sodii Hydroxidum*, when concentrated to the proper strength.

Introduce about 20 mils of Solution of Sodium Hydroxide into a flask, stopper, weigh accurately and titrate it directly with normal hydrochloric acid V.S., using methyl orange T.S. as indicator. It shows not more than 5.5 per cent. of alkalinity, calculated as NaOH (*carbonate*).

Assay—Transfer about 50 mils of Solution of Sodium Hydroxide, accurately weighed, to a 250 mil measuring-flask, add 20 mils of barium chloride T.S. and fill the flask to the mark with distilled water, which has been previously boiled and cooled. Then thoroughly agitate the liquid, filter it through a dry filter, reject the first 20 mils, and titrate 100 mils of the clear filtrate with normal hydrochloric acid V.S., using phenolphthalein T.S. as indicator. It shows not less than 4.5 per cent. of NaOH when calculated to the amount of solution originally taken.

Each mil of normal hydrochloric acid V.S. used corresponds to 0.04001 Gm. of NaOH. Each gramme of Solution of Sodium Hydroxide corresponds to not less than 1.12 mils of normal hydrochloric acid V.S.

AVERAGE DOSE—Metric, 1 mil—Apothecaries, 15 minims.

LIQUOR ZINCI CHLORIDI

Solution of Zinc Chloride

Liq. Zinc. Chlor.

An aqueous solution containing not less than 48.5 per cent. nor more than 52 per cent. of $ZnCl_2$ (136.29).

ZINC, granulated, *two hundred and forty grammes*.........	240 Gm.
HYDROCHLORIC ACID, *eight hundred and forty grammes*....	840 Gm.
NITRIC ACID, *twelve grammes*........................	12 Gm.
PRECIPITATED ZINC CARBONATE, *twelve grammes*.........	12 Gm.
DISTILLED WATER, *a sufficient quantity*,	
To make about *one thousand grammes*.......	1000 Gm.

Add the hydrochloric acid gradually to the zinc and *two hundred and fifty mils* of distilled water contained in a glass or porcelain vessel, and allow the mixture to stand until the reaction ceases and the acid is saturated. Then pour off the liquid, add the nitric acid and heat the mixture at a temperature not exceeding 115° C., until a portion, when removed and cooled, solidifies. Allow it to cool, and dissolve the solidified mass in sufficient distilled water to make the product weigh *one thousand grammes*. Then add the precipitated zinc carbonate, agitate the mixture occasionally during twenty-four hours, and set it aside until it has become clear by subsidence. Separate the clear Solution by decantation or by means of a siphon, and preserve it in tightly stoppered bottles.

Solution of Zinc Chloride is a clear, colorless, odorless liquid, having a very astringent, metallic taste, and an acid reaction.

Specific gravity: about 1.548 at 25° C.

It conforms to the identity and purity tests for an aqueous solution of the salt as given under *Zinci Chloridum*, when taken in proportionate amount.

Assay—Transfer to a tared flask about 0.6 Gm. of Solution of Zinc Chloride, weigh accurately, and proceed as directed under the Assay for chlorides (see Part II, Test No. 5). It shows not less than 48.5 per cent. nor more than 52 per cent. of $ZnCl_2$.

Each mil of tenth-normal silver nitrate V.S. used corresponds to 0.0068145 Gm. of $ZnCl_2$. Each gramme of Solution of Zinc Chloride corresponds to not less than 71.2 mils nor more than 76.3 mils of tenth-normal silver nitrate V.S.

LITHII BROMIDUM

Lithium Bromide

Lith. Brom.

It contains not less than 85 per cent. of LiBr (86.86). Preserve it in air-tight containers.

Lithium Bromide is a white, granular salt, odorless and having a sharp, slightly bitter taste; very deliquescent.

One Gm. of Lithium Bromide dissolves in 0.6 mil of water at 25° C.; also in 0.4 mil of boiling water; freely soluble in alcohol and soluble in ether.

An aqueous solution of the salt (1 in 20) is neutral or slightly alkaline to litmus.

At a low red heat the salt fuses, and at a higher heat it is slowly volatilized. It imparts a crimson color to a non-luminous flame.

Silver nitrate T.S., added to an aqueous solution of the salt (1 in 10), produces a yellowish-white precipitate insoluble in nitric acid or in a moderate excess of ammonia water.

Add a few drops of ferric chloride T.S. and 1 mil of chloroform to 10 mils of an aqueous solution of the salt (1 in 20) and shake the mixture. The chloroform does not acquire a violet tint (*iodide*).

Drop 1 mil of diluted sulphuric acid on about 1 Gm. of the powdered salt; no yellow color appears at once (*bromate*).

Dissolve about 0.1 Gm. of Lithium Bromide in 5 mils of distilled water, add an excess of silver nitrate T.S. and a few drops of nitric acid; filter and wash the precipitate with distilled water, then digest it for ten minutes with 5 mils of ammonium carbonate T.S. and filter. On supersaturating the filtrate with nitric acid, not more than a slight turbidity is produced at once (*chloride*).

Five mils of an aqueous solution of the salt (1 in 100) acidulated with 3 drops of hydrochloric acid shows no immediate turbidity with 1 mil of barium chloride T.S. (*sulphate*).

Add 5 mils of hydrochloric acid and 5 mils of chlorine T.S. to 0.4 Gm. of Lithium Bromide contained in a flat-bottomed flask of 50 mils capacity, evaporate the mixture almost to dryness on a water bath, add 10 mils of amyl alcohol and cautiously heat the mixture until the lower aqueous layer has evaporated. Then add 3 drops of hydrochloric acid and boil the solution for three minutes; the resulting insoluble residue, if any, when collected on a filter, washed with amyl alcohol and dried at 110° C., weighs not more than 0.002 Gm. (*other alkalies*). The removal of water from the amyl alcohol mixture is facilitated by passing a current of air through the hot solution.

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

Assay—Introduce into a tared weighing-bottle about 0.35 Gm. of Lithium Bromide, stopper, weigh accurately, and proceed as directed under the Assay for bromides (see Part II, Test No. 5). It shows not less than 85 per cent. of LiBr.

Each mil of tenth-normal silver nitrate V.S. used corresponds to 0.008686 Gm. of LiBr. Each gramme of Lithium Bromide corresponds to not less than 97.9 mils of tenth-normal silver nitrate V.S.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

LITHII CARBONAS

Lithium Carbonate

Lith. Carb.

It contains, when dried to constant weight at 100° C., not less than 98.5 per cent. of Li_2CO_3 (73.88). Preserve it in well-closed containers.

Lithium Carbonate is a light, white powder, odorless, and having an alkaline taste; permanent in the air.

One Gm. of Lithium Carbonate dissolves in 78 mils of water at 25° C.; also in 140 mils of boiling water; almost insoluble in alcohol; dissolved by diluted acids with effervescence.

At a low red heat the salt fuses; at a higher temperature it loses some of its carbon dioxide, and is partially converted into lithium oxide. It imparts a crimson color to a non-luminous flame.

A saturated aqueous solution of the salt is alkaline to litmus.

Lithium Carbonate, when dissolved in 40 parts of diluted acetic acid, leaves not more than 0.15 per cent. of insoluble residue.

Mix 1 part of Lithium Carbonate with 20 parts of distilled water and add hydrochloric acid, drop by drop, with agitation until solution takes place. The resulting solution, after boiling and cooling, responds to the following tests when applied to separate portions:

The addition of ammonia water to 5 mils of this solution until it has an alkaline reaction produces neither turbidity nor precipitation either before or after boiling (*iron, aluminum*).

Dilute another portion of 4 mils of this solution with 6 mils of distilled water; it does not respond to the Test for heavy metals (see Part II, Test No. 3).

Add a slight excess of diluted hydrochloric acid to 0.2 Gm. of Lithium Carbonate contained in a flat-bottomed flask of 50 mils capacity, evaporate the mixture almost to dryness on a water bath, add 10 mils of amyl alcohol and cautiously heat the mixture until the lower aqueous layer has evaporated. Then add 3 drops of hydrochloric acid and boil the solution for three minutes. The resulting insoluble residue, if any, when collected on a filter, washed with amyl alcohol and dried at 110° C., weighs not more than 0.002 Gm. (*other alkalies*). The removal of the water from the amyl alcohol mixture is facilitated by passing a current of air through the hot solution.

Assay—Dissolve about 1.5 Gm. of Lithium Carbonate, previously dried to constant weight at 100° C. and accurately weighed, in 50 mils of normal sulphuric acid V.S. and titrate the solution with normal potassium hydroxide V.S., methyl orange T.S. being used as indicator. It shows, in the dried salt, not less than 98.5 per cent. of Li_2CO_3.

Each mil of normal sulphuric acid V.S. used corresponds to 0.03694 Gm. of Li_2CO_3. Each gramme of Lithium Carbonate, previously dried, corresponds to not less than 26.7 mils of normal sulphuric acid V.S.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

LITHII CITRAS

Lithium Citrate

Lith. Cit.

It contains not less than 98.5 per cent. of $Li_3C_6H_5O_7 + 4H_2O$ (281.92). Preserve it in air-tight containers.

Lithium Citrate occurs as a white powder, or in the granular form, odorless, and having a cooling, faintly alkaline taste. It is deliquescent on exposure to moist air and loses its water of crystallization when heated to 150° C.

One Gm. of Lithium Citrate dissolves in 1.4 mils of water at 25° C.; very slightly soluble in alcohol.

An aqueous solution of the salt (1 in 20) is faintly alkaline to litmus but is not reddened by one drop of phenolphthalein T.S.

At a red heat the salt chars, emits inflammable vapors having a pungent odor, and finally leaves a black residue of lithium carbonate mixed with carbon. It imparts a crimson color to a non-luminous flame.

Boil an aqueous solution of Lithium Citrate (1 in 20) with an equal volume of calcium chloride T.S.; a white precipitate forms.

Treat the residue obtained by igniting 0.4 Gm. of the salt at a red heat with a slight excess of diluted hydrochloric acid, filter, wash the residue with distilled water, evaporate the filtrate and washings almost to dryness on a water bath, in a flat-bottomed flask of 50 mils capacity, add 10 mils of amyl alcohol and cautiously heat the mixture until the lower aqueous layer has evaporated. Then add 3 drops of hydrochloric acid and boil the solution for three minutes. The resulting insoluble residue, if any, when collected on a filter, washed with amyl alcohol and dried at 110° C., weighs not more than 0.004 Gm. (*other alkalies*). The removal of the water from the amyl alcohol mixture is facilitated by passing a current of air through the hot solution.

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

Assay—Proceed as directed under the Assay for alkali salts of organic acids (see Part II, Test No. 6). It shows not less than 98.5 per cent. of $Li_3C_6H_5O_7+4H_2O$.

Each mil of half-normal sulphuric acid V.S. used corresponds to 0.04699 Gm. of $Li_3C_6H_5O_7+4H_2O$. Each gramme of Lithium Citrate corresponds to not less than 21 mils of half-normal sulphuric acid V.S.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

LOBELIA

Lobelia

Lobel.—Indian Tobacco

The dried leaves and flowering tops of *Lobelia inflata* Linné (Fam. *Lobeliaceæ*), without the presence or admixture of more than 10 per cent. of stems or other foreign matter.

Stems cylindrical, coarsely and irregularly furrowed, yellowish-green, occasionally purplish and with numerous spreading hairs; leaves alternate, sessile or narrowing into a short petiole, usually more or less broken; when entire, laminæ ovate or oblong, from 2 to 9 cm. in length, obtusely toothed or irregularly serrate-denticulate, each tooth with a yellowish-brown, gland-like apex; pale green and with scattered, bristly hairs; flowers blue in long, loose racemes with short pedicels, calyx tube ovoid, with 5 subulate teeth, corolla tubular, from 3 to 4 mm. in length, 5-parted, the upper 2-lobed portion cleft nearly to the base; stamens with anthers united above into a curved tube enclosing the bifid stigmas; capsules ovoid or ellipsoidal, from 5 to 8 mm. in length, light brown, wholly inferior and enclosing numerous brownish, oblong and coarsely reticulate seeds; odor slight, taste strongly acrid.

The powder is dark green, odor irritating; fragments of seed-coat composed of more or less polygonal cells with thick, yellowish walls; occasionally, non-glandular hairs elongated-conical, from 0.3 to 0.6 mm. in length; fragments of stem with tracheæ showing annular or spiral thickenings or simple pores associated with narrow wood-fibers, the walls of the latter being rather thin, more or less lignified and porous; fragments of epidermis of leaf with elliptical stomata, 0.025 mm. in length, and usually with 3 or 4 neighboring cells; pollen grains nearly spherical, from 0.015 to 0.03 mm. in diameter.

Lobelia yields not more than 8 per cent. of ash.

Preparations—Fluidextractum Lobeliæ Tinctura Lobeliæ.

AVERAGE DOSE—Metric, 0.15 Gm.—Apothecaries, 2½ grains.

LYCOPODIUM

Lycopodium

Lycopod.

The spores of *Lycopodium clavatum* Linné (Fam. *Lycopodiaceæ*), without the presence or admixture of more than 2 per cent. of impurities.

A light yellow, very mobile powder, nearly inodorous and tasteless. It is not wetted by water but floats upon it; when boiled with water it sinks; when thrown into a flame it burns with a quick flash.

Under the microscope, the spores of Lycopodium are spherical tetrahedrons, from 0.025 to 0.04 mm. in diameter; in section they vary from plano-convex to triangular, the outer wall or exosporium being extended in the form of slight, irregular projections, giving the surface of the spore a reticulate appearance, the reticulations being polygonal and formed of straight sides; when viewed so that the rounded surface of the spores is on the under side, the upper surface is characterized by a distinct, triangular marking, being the edges of the three straight surfaces, extending from the center of the spores to near the outer edge.

Lycopodium shows very few, if any, pollen grains of species of Pine, the latter being from 0.04 to 0.07 mm. in diameter, and consisting of three parts, in which a central, convex, generative cell separates the two spherical cells or wings which are blackish, due to the inclusion of air.

Lycopodium yields not more than 3 per cent. of ash.

MAGMA BISMUTHI

Bismuth Magma

Magma Bism.—Milk of Bismuth

Bismuth Magma yields not less than 5.6 per cent. nor more than 6.2 per cent. of Bi_2O_3.

BISMUTH SUBNITRATE, *eighty grammes*..................	80 Gm.
NITRIC ACID, *one hundred and twenty milliliters*..........	120 mils
AMMONIUM CARBONATE, *ten grammes*..................	10 Gm.
AMMONIA WATER,	
DISTILLED WATER, each, *a sufficient quantity*,	
To make *one thousand milliliters*...........	1000 mils

Mix the bismuth subnitrate with *sixty mils* of distilled water and *sixty mils* of nitric acid in a flask and agitate, warming gently until solution is effected. Pour this solution, with constant stirring, into *five thousand mils* of distilled water containing *sixty mils* of nitric acid. Dilute *four hundred and eighty mils* of ammonia water with *four* *thousand mils* of distilled water in a glazed or glass vessel of at least *twelve thousand mils* capacity. Dissolve the ammonium carbonate in this solution and then quickly pour the bismuth solution into it with constant stirring. If the mixture is not distinctly alkaline, add sufficient ammonia water to make it so and allow it to stand until the precipitate has subsided, then pour or siphon off the supernatant liquid and wash the precipitate twice with distilled water, by decantation. Afterwards transfer the magma to a strainer of close texture, arranged in a percolator so as to provide continuous washing with distilled water, the outlet tube being elevated to prevent the surface of the magma from becoming dry, and allow the operation to proceed until the washings cease to react with phenolphthalein T.S. Then drain the moist magma, transfer it to a graduated vessel and add sufficient distilled water to make the product measure *one thousand mils.* Mix thoroughly, transfer to bottles and stopper tightly.

A thick, white, opaque liquid containing bismuth hydroxide and bismuth subcarbonate in suspension in water. It is neutral to litmus and phenolphthalein.

One mil of hydrochloric acid added to 1 mil of Bismuth Magma produces a clear solution. Pour the clear solution into 10 volumes of distilled water; a white precipitate is produced.

Assay—Evaporate to dryness about 10 Gm. of Bismuth Magma, accurately weighed, and ignite the residue to constant weight; the residue corresponds to not less than 5.6 per cent. nor more than 6.2 per cent. of the weight of Bismuth Magma taken.

AVERAGE DOSE—Metric, 4 mils—Apothecaries, 1 fluidrachm.

MAGMA MAGNESIÆ

Magnesia Magma

Magma Mag.—Milk of Magnesia

Magnesia Magma yields not less than 6.5 per cent. nor more than 7.5 per cent. of $Mg(OH)_2$ (58.34).

MAGNESIUM CARBONATE, in fine powder, *one hundred and twenty-five grammes*	125 Gm.
SODIUM HYDROXIDE, *eighty grammes*	80 Gm.
DISTILLED WATER, *a sufficient quantity,*	
To make *one thousand mils*	1000 mils

Mix the magnesium carbonate with enough distilled water (about *five hundred mils*) and make a smooth mixture. Dissolve the sodium hydroxide in *four hundred mils* of distilled water, add the solution to the magnesia mixture with constant stirring, and agitate it frequently during fifteen minutes. Wash the resulting magma by decantation, using *two* *thousand mils* of distilled water each time, until the red color produced in 50 mils of the washings by 3 drops of phenolphthalein T.S. is discharged by the addition of 1 drop of diluted sulphuric acid. Then allow the precipitate to subside until it measures *one thousand mils*, decant the supernatant liquid, transfer the product to wide-mouthed bottles, and tightly stopper with corks which have been dipped in melted paraffin.

NOTE—The distilled water in this preparation may be replaced by water which has been heated to boiling with powdered magnesium carbonate (5 Gm. in each 1000 mils) and then filtered. One-half mil of oil of peppermint, or a sufficient quantity of oil of anise or other suitable flavoring may be added if desired.

A thick, white liquid containing magnesium hydroxide in suspension in water.

It is alkaline to litmus and phenolphthalein.

The addition of 2 mils of diluted hydrochloric acid to 1 mil of Magnesia Magma causes the evolution of not more than a few isolated bubbles and the resulting solution is not more than slightly turbid. Add 0.5 Gm. of ammonium chloride to the solution, filter, and render the filtrate alkaline with ammonia water; no precipitate is produced, but upon the addition of sodium phosphate T.S. to this alkaline solution, a white precipitate appears.

Dilute 10 mils of Magnesia Magma with distilled water to make 100 mils, and allow it to stand until the precipitate has settled. Then remove 50 mils of the clear liquid and evaporate it to dryness on a water bath. The residue, when dried to constant weight, does not exceed 0.005 Gm., and, when dissolved in a few mils of distilled water and a drop of methyl orange T.S. added, yields a red color upon the addition of 5 drops of tenth-normal sulphuric acid V.S.

Assay—Transfer about 5 Gm. of Magnesia Magma to a tared flask, stopper and weigh accurately, add 25 mils of normal sulphuric acid V.S., and, after solution is complete, titrate the excess of acid with normal potassium hydroxide V.S., using methyl orange T.S. as indicator. It shows an amount of magnesium hydroxide corresponding to not less than 6.5 per cent. nor more than 7.5 per cent. of the weight of Magnesia Magma taken.

Each mil of normal sulphuric acid V.S. used corresponds to 0.02917 Gm. of $Mg(OH)_2$. Each gramme of Magnesia Magma corresponds to not less than 2.23 mils nor more than 2.57 mils of normal potassium hydroxide V.S.

AVERAGE DOSE—Metric, 10 mils—Apothecaries, 2½ fluidrachms.

MAGNESII CARBONAS

Magnesium Carbonate

Mag. Carb.

A mixture of hydrated magnesium carbonate and magnesium hydroxide, corresponding to not less than 39.2 per cent. of MgO (40.32) and containing not more than 0.8 per cent. of CaO.

Magnesium Carbonate occurs in light, white, friable masses, or as a bulky, white powder, without odor, and having a slight, earthy taste; permanent in the air.

Magnesium Carbonate is practically insoluble in water to which, however, it imparts a slightly alkaline reaction; insoluble in alcohol; dissolved by dilute acids with effervescence.

When strongly heated, it loses water and carbon dioxide, and is converted into magnesium oxide.

A solution of Magnesium Carbonate in diluted hydrochloric acid, when mixed with ammonium chloride T.S. and an excess of ammonia water, yields with sodium phosphate T.S. a white crystalline precipitate.

Heat to boiling, 1 Gm. of Magnesium Carbonate with 50 mils of distilled water, and, after cooling, filter and evaporate the filtrate to dryness on a water bath; not more than 0.01 Gm. of residue remains (*soluble salts*).

Dissolve 2.5 Gm. of Magnesium Carbonate in 50 mils of diluted hydrochloric acid and 200 mils of distilled water. The solution is colorless, and a 20 mil portion does not give an immediate blue coloration upon the addition of 5 drops of potassium ferrocyanide T.S. (*iron*).

Dissolve 0.5 Gm. of Magnesium Carbonate in a slight excess of diluted hydrochloric acid (about 5 mils) and dilute with distilled water to 25 mils. Ten mils of this solution does not respond to the Test for heavy metals (see Part II, Test No. 3).

Dissolve 4 Gm. of Magnesium Carbonate in 50 mils of diluted hydrochloric acid, in a beaker of about 800 mils capacity. Dilute this solution to about 400 mils with distilled water, add 5 Gm. of ammonium chloride, heat to boiling, then add 50 mils of ammonium oxalate T.S., followed by 5 drops of methyl orange T.S., and afterward by ammonia water (previously diluted with two volumes of distilled water), added slowly in small portions, stirring constantly, until the liquid has assumed a yellow color. This operation should require about twenty minutes. Allow the liquid to stand for four hours or over night, collect the precipitate on a filter, wash it with hot distilled water, containing 1 per cent. of ammonium oxalate T.S., until the washings, after strongly acidifying with nitric acid, cease to react with silver nitrate T.S. Dissolve the precipitate by pouring 50 mils of warm diluted hydrochloric acid in small portions over the filter, wash the filter with about 100 mils of distilled water, collect the solution of the precipitate and washings in the same beaker, then dilute to 400 mils with distilled water, precipitate, allow to stand, and wash as before, omitting, however, the addition of 5 Gm. of ammonium chloride. Dry the precipitate and filter obtained in the second precipitation and cautiously ignite in a platinum crucible, heating gently at first, gradually increasing the temperature, and finally heating it over a blast lamp for fifteen minutes or longer, if necessary, until of constant weight. Cool the crucible and contents in a desiccator before weighing. The weight of CaO so obtained does not exceed 0.032 Gm., corresponding to not more than 0.8 per cent. (*calcium oxide*).

Assay—Dissolve 1 Gm. of Magnesium Carbonate in 30 mils of normal sulphuric acid V.S. and determine the residual acid by titrating with normal potassium hydroxide V.S., using methyl orange T.S. as indicator. The amount of normal sulphuric acid V.S. consumed, exclusive of the normal sulphuric acid V.S. corresponding to the calcium oxide found, is not less than 19.44 mils, indicating the presence of not less than 39.2 per cent. of MgO.

Each mil of normal sulphuric acid V.S. corresponds to 0.02016 Gm. of MgO or to 0.028035 Gm. of CaO.

AVERAGE DOSE—Metric, 3 Gm.—Apothecaries, 45 grains.

MAGNESII OXIDUM

Magnesium Oxide

Mag. Oxid.—Magnesia Calcined Magnesia Light Magnesia

It contains, after ignition, not less than 96 per cent. of MgO (40.32) and not more than 2 per cent. of CaO. It contains not more than 10 per cent. of water. Preserve it in well-closed containers.

Magnesium Oxide is a white, very bulky, and very fine powder, without odor, and having an earthy, but not a saline taste. On exposure to the air, it slowly absorbs moisture and carbon dioxide.

Magnesium Oxide is almost insoluble in water; insoluble in alcohol; dissolved by dilute acids.

A solution of Magnesium Oxide in diluted hydrochloric acid, mixed with ammonium chloride T.S. and an excess of ammonia water, yields with sodium phosphate T.S. a white crystalline precipitate.

Heat to boiling 1 Gm. of Magnesium Oxide with 50 mils of distilled water, and, after cooling, filter; the filtrate is not more than faintly alkaline to litmus, and when evaporated to dryness leaves not more than 0.02 Gm. of residue (*soluble salts*).

Heat to boiling, a mixture of 0.1 Gm. of Magnesium Oxide with 5 mils of distilled water, and, after cooling, pour it into 5 mils of acetic acid. Solution takes place without the evolution of more than a few isolated gas bubbles (*carbonate*).

Dissolve 1 Gm. of Magnesium Oxide in 50 mils of diluted hydrochloric acid and 200 mils of distilled water. The solution is colorless, and a 20 mil portion does not give an immediate blue coloration upon the addition of several drops of potassium ferrocyanide T.S. (*iron*).

Dissolve 0.5 Gm. of Magnesium Oxide in a slight excess of diluted hydrochloric acid and dilute with distilled water to 25 mils. Ten mils of this solution does not respond to the Test for heavy metals (see Part II, Test No. 3).

Transfer to a porcelain crucible about 1 Gm. of Magnesium Oxide, weigh accurately, and expose it to a low red heat; it loses not more than 10 per cent. of its weight (*water*).

To test for calcium proceed as directed under *Magnesii Carbonas*, using about 1.5 Gm. of recently ignited Magnesium Oxide, accurately weighed. It shows not more than 2 per cent. of CaO.

Assay—Dissolve about 0.5 Gm. of Magnesium Oxide, which has been recently ignited to constant weight and accurately weighed, in 30 mils of normal sulphuric acid V.S. and determine the residual acid by titrating with normal potassium hydroxide V.S., using methyl orange T.S. as indicator. The amount of normal sulphuric acid V.S. consumed, exclusive of the normal sulphuric acid V.S. corresponding to the calcium oxide found, when calculated to 1 Gm. of the ignited Magnesium Oxide, is not less than 47.62 mils, indicating the presence of not less than 96 per cent. of MgO.

Each mil of normal sulphuric acid V.S. used corresponds to 0.02016 Gm. of MgO or to 0.028035 Gm. of CaO.

Preparation—Pulvis Rhei Compositus.

AVERAGE DOSE—Metric, 2 Gm.—Apothecaries, 30 grains.

MAGNESII OXIDUM PONDEROSUM

Heavy Magnesium Oxide

Mag. Oxid. Pond.—Heavy Magnesia

It contains, after ignition, not less than 96 per cent. of MgO (40.32) and not more than 2 per cent. of CaO. It contains not more than 10 per cent. of water. Preserve it in well-closed containers.

Heavy Magnesium Oxide is a white, dense, and very fine powder, which conforms to the reactions and tests under *Magnesii Oxidum.*

AVERAGE DOSE—Metric, 2 Gm.—Apothecaries, 30 grains.

MAGNESII SULPHAS

Magnesium Sulphate

Mag. Sulph.—Epsom Salt

It contains not less than 48.59 per cent. nor more than 53.45 per cent. of anhydrous magnesium sulphate, corresponding to not less than 99.5 per cent. of the crystallized salt [$MgSO_4+7H_2O=246.50$]. Preserve it in well-closed containers.

Magnesium Sulphate occurs as small, colorless, prismatic needles or rhombic prisms, without odor, and having a cooling, saline, and bitter taste; slowly efflorescent in the air.

One Gm. of Magnesium Sulphate dissolves in 1 mil of water at 25° C.; also in about 0.2 mil of boiling water; almost insoluble in alcohol at 25° C.

An aqueous solution of the salt (1 in 20) is neutral to litmus.

When exposed to warm air, the salt loses some of its water of crystallization and is converted into a white powder. Further heating removes more water, and at a temperature somewhat above 200° C. it is rendered anhydrous.

An aqueous solution of the salt (1 in 20), when mixed with ammonium chloride T.S. and ammonia water, yields with sodium phosphate T.S. a white, crystalline precipitate. An aqueous solution (1 in 20) yields with barium chloride T.S. a white precipitate insoluble in hydrochloric acid.

Add a few drops of silver nitrate T.S. to 10 mils of an aqueous solution of the salt (1 in 20), previously mixed with a few drops of nitric acid; not more than an opalescence is produced (*chloride*).

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

An aqueous solution of the salt meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Assay—Dissolve about 1 Gm. of Magnesium Sulphate, accurately weighed, in 100 mils of distilled water, gradually add to the solution, with constant stirring, an excess of sodium phosphate T.S. (about 20 mils), allow to stand for ten minutes, then add 30 mils of ammonia water and allow to stand for four hours. Collect the precipitate on a filter, wash it with dilute ammonia water (1 volume of ammonia water to 3 volumes of distilled water) until 10 mils of the washings, when acidulated with hydrochloric acid, yields no turbidity on the addition of a few drops of barium chloride T.S. Dry and ignite to constant weight. The weight of the magnesium pyrophosphate so obtained corresponds to not less than 48.59 per cent. nor more than 53.45 per cent. of $MgSO_4$.

Each gramme of Magnesium Sulphate corresponds to not less than 0.4495 Gm. nor more than 0.4944 Gm. of magnesium pyrophosphate ($Mg_2P_2O_7$).

Preparation—Infusum Sennæ Compositum.

AVERAGE DOSE—Metric, 15 Gm.—Apothecaries, 4 drachms.

MALTUM

Malt

The grain of one or more varieties of *Hordeum sativum* Jessen (Fam. *Gramineæ*), partially germinated artificially, and then dried at a temperature not exceeding 55° C. It is capable of converting not less than 5 times its weight of starch into sugars. Protect it from heat and moisture.

Malt occurs in yellowish or amber-colored grains; crisp when fractured, the interior surface nearly white.

It has an agreeable, characteristic odor, and a sweet taste due to the conversion of the starch in the seed into maltose, through the action of diastase. Malt floats in cold water.

For the subsequent tests, prepare an infusion as follows: Mix 10 Gm. of Malt in No. 12 powder, with 100 mils of distilled water and maintain the mixture at a temperature of from 50° to 55° C. for one hour with occasional stirring. Place it upon a filter and when the liquid has passed through, wash the contents of the filter with distilled water, in small portions, until the combined infusion and washings measure 200 mils.

The weight of the solid soluble constituents of Malt, obtained by evaporating to dryness on a water bath an aliquot portion of the freshly prepared, aqueous infusion, and subsequently drying it for one hour at 100° C. in an air bath, corresponds to not less than 70 per cent. of the Malt taken.

The acidity of Malt (calculated as lactic acid) does not exceed 0.3 per cent. as determined by titrating an aliquot portion of the freshly prepared infusion with tenth-normal potassium hydroxide V.S., phenolphthalein T.S. being used as indicator. Each mil of tenth-normal potassium hydroxide V.S. used corresponds to 0.009 Gm. of lactic acid.

Assay—To determine the starch converting power of Malt, proceed as directed under *Diastasum*, page 131, using 20 mils of a freshly prepared infusion of malt in place of the quantity of solution of diastase there directed.

Preparation—Extractum Malti.

MANGANI DIOXIDUM PRÆCIPITATUM

Precipitated Manganese Dioxide

Mangan. Diox. Præc.

It consists chiefly of manganese dioxide [MnO_2=86.93] with small amounts of other oxides of manganese, corresponding to not less than 80 per cent. of MnO_2.

Precipitated Manganese Dioxide is a heavy, very fine, black powder, without odor or taste; permanent in the air.

It is insoluble in water or alcohol.

When heated with hydrochloric acid, it is converted into manganous chloride and chlorine is evolved. At a red heat Precipitated Manganese Dioxide gives off oxygen and is converted into reddish-brown manganous-manganic oxide (Mn_3O_4).

Add 2 drops of hydrochloric acid to about 0.1 Gm. of Precipitated Manganese Dioxide contained in a test tube, boil the mixture for one minute with 0.5 Gm. of lead peroxide and 5 mils of nitric acid and then add 5 mils of distilled water; the liquid assumes a reddish-violet color.

Add 20 mils of distilled water to 1 Gm. of Manganese Dioxide and 2 Gm. of oxalic acid, follow this by 3 mils of sulphuric acid, and digest the mixture for several hours on a water bath; not more than 0.2 per cent. of residue remains (*insoluble substances*).

Assay—Dissolve about 0.2 Gm. of Precipitated Manganese Dioxide, accurately weighed, in a mixture of 50 mils of tenth-normal oxalic acid V.S. and 3 mils of sulphuric acid, heat to 80° C. on a water bath, and titrate the residual oxalic acid with tenth-normal potassium permanganate V.S. It shows not less than 80 per cent. of MnO_2.

Each mil of tenth-normal oxalic acid V.S. used corresponds to 0.0043465 Gm. of MnO_2. Each gramme of Precipitated Manganese Dioxide corresponds to not less than 184 mils of tenth-normal oxalic acid V.S.

AVERAGE DOSE—Metric, 0.25 Gm.—Apothecaries, 4 grains.

MANNA

Manna

The dried saccharine exudation of *Fraxinus Ornus* Linné (Fam. *Oleaceæ*).

In irregular, more or less elongated, flattened, 3-sided pieces; externally yellowish-white; friable, somewhat waxy; internally nearly white, porous and crystalline in appearance; odor slight, but characteristic; taste sweet, slightly bitter and faintly acrid. Manna also occurs in irregular masses, consisting in part of brittle or soft, resin-like fragments; from yellowish-white to yellowish-gray in color. The quantity of the yellowish-white fragments must not be less than 40 per cent. of the whole.

Add 5 Gm. of Manna to 100 mils of alcohol, heat to boiling and filter; on cooling, the filtrate rapidly deposits crystals of mannite.

Preparation—Infusum Sennæ Compositum.

Average dose—Metric, 15 Gm.—Apothecaries, 4 drachms.

MASSA FERRI CARBONATIS

Mass of Ferrous Carbonate

Mass. Ferr. Carb.—Vallet's Mass

It contains not less than 35 per cent. of $FeCO_3$ (115.84).

Ferrous Sulphate, *one hundred grammes*	100 Gm.
Monohydrated Sodium Carbonate, *forty-six grammes*	46 Gm.
Clarified Honey, *thirty-eight grammes*	38 Gm.
Sugar, in coarse powder, *twenty-five grammes*	25 Gm.
Syrup,	
Distilled Water, each, *a sufficient quantity,*	
To make *one hundred grammes*	100 Gm.

Dissolve the ferrous sulphate and the monohydrated sodium carbonate, each separately, in *two hundred mils* of boiling distilled water, and, having added *twenty mils* of syrup to the solution of the iron salt, filter both solutions, and allow them to become cold. Place the solution of monohydrated sodium carbonate in a bottle having a capacity of about *five hundred mils,* and gradually add the solution of the iron salt, rotating the bottle frequently, until carbonic acid gas no longer escapes. Add sufficient distilled water to fill the bottle; then cork it and set it aside, so that the ferrous carbonate may subside. Pour off the supernatant liquid, and, having mixed syrup and distilled water in the proportion of *one volume* of syrup to *nineteen volumes* of distilled water, wash the precipitate with the mixture by decantation until the washings no longer have a saline taste. Drain the precipitate on a muslin strainer, and express as much of the water as possible. Lastly, mix the precipitate at once with the clarified honey and sugar, and, by means of a water bath, evaporate the mixture in a tared dish, with constant stirring, until it is reduced to *one hundred grammes.*

Assay—Dissolve about 1 Gm. of Mass of Ferrous Carbonate, accurately weighed, in 15 mils of diluted sulphuric acid, dilute the solution with distilled water to about 100 mils and immediately titrate with tenth-normal potassium dichromate V.S., potassium ferricyanide T.S. being used as indicator. It shows not less than 35 per cent. of $FeCO_3$.

Each mil of tenth-normal potassium dichromate V.S. used corresponds to 0.011584 Gm. of $FeCO_3$. Each gramme of Mass of Ferrous Carbonate corresponds to not less than 30.2 mils of tenth-normal potassium dichromate V.S.

Average dose—Metric, 0.25 Gm.—Apothecaries, 4 grains.

MASSA HYDRARGYRI

Mass of Mercury

Mass. Hydrarg.—Blue Mass Blue Pill

It contains not less than 32 per cent. nor more than 34 per cent. of Hg. Preserve the product in well-closed containers.

Mercury, *thirty-three grammes*	33 Gm.
Oleate of Mercury, *one gramme*	1 Gm.
Glycyrrhiza, in No. 60 powder, *ten grammes*	10 Gm.
Althæa, in No. 60 powder, *fifteen grammes*	15 Gm.
Glycerin, *nine grammes*	9 Gm.
Honey of Rose, *thirty-two grammes*	32 Gm.
To make *one hundred grammes*	100 Gm.

Triturate the oleate of mercury in a warm mortar, gradually add the mercury, then introduce a small amount of honey of rose and triturate the mixture until globules of mercury are no longer visible under a lens magnifying ten diameters. Now incorporate the remainder of the honey of rose and the glycerin, then gradually add the glycyrrhiza and althæa and continue the trituration until the mass is homogeneous.

Assay—Place about 0.5 Gm. of Mass of Mercury, accurately weighed, in a porcelain dish, add 10 mils of sulphuric acid, heat on a water bath for ten minutes, then add 10 mils of nitric acid and heat the mixture on a sand bath, adding small portions of nitric acid, if necessary, until a colorless or nearly colorless solution results. Now add potassium permanganate T.S. to the hot solution until the red color persists, then discharge the color by the addition of just sufficient oxalic acid T.S. Wash the solution into a flask with distilled water, dissolve any insoluble residue by the addition of nitric acid, dilute the solution to about 150 mils, add 2 mils of ferric ammonium sulphate T.S. and titrate the solution with tenth-normal potassium sulphocyanate V.S. to the production of a pink tint. It shows not less than 32 per cent. nor more than 34 per cent. of Hg.

Each mil of tenth-normal potassium sulphocyanate V.S. used corresponds to 0.01003 Gm. of Hg. Each gramme of Mass of Mercury corresponds to not less than 31.9 nor more than 33.9 mils of tenth-normal potassium sulphocyanate V.S.

Average dose—Metric, 0.25 Gm.—Apothecaries, 4 grains.

MATRICARIA

Matricaria

Matricar.—German Chamomile Wild Chamomile

The dried flower-heads of *Matricaria Chamomilla* Linné (Fam. *Compositæ*), without the presence or admixture of more than 5 per cent. of stems or foreign matter. Preserve it in tightly-closed containers and guard against attack by insects.

Flower-heads composed of a few white ray-florets and numerous yellow disk-florets on conical, more or less hollow receptacles, the latter being from 3 to 10 mm. in breadth; disk-flowers tubular, perfect, and without a pappus; ray-flowers from 10 to 20, pistillate, corolla white, 3-toothed and 4-veined, usually reflexed; involucre hemispherical, composed of from 20 to 30 imbricated, oblanceolate, and pubescent scales; peduncles light green to brownish-green, longitudinally furrowed, more or less twisted and attaining a length of 2.5 cm.; achenes somewhat obovoid and faintly 3- to 5-ribbed; pappus none, or only a slight membranous crown; odor pleasant, aromatic; taste aromatic and bitter.

Matricaria yields not more than 13 per cent. of ash.

AVERAGE DOSE—Metric, 15 Gm.—Apothecaries, 4 drachms.

MEL

Honey

A saccharine secretion deposited in the honey-comb by the bee, *Apis mellifera* Linné (Fam. *Apidæ*).

Honey is a thick, syrupy liquid of a light yellowish or yellowish-brown color, translucent when fresh, but gradually becoming opaque and crystalline; having a characteristic odor, and a sweet, faintly acrid taste.

It is slightly acid to litmus and is lævorotatory.

Dilute Honey with twice its weight of water; the resulting liquid is only moderately turbid, not stringy, and has a specific gravity of not less than 1.099 at 25° C. (corresponding to a specific gravity of not less than 1.370 for the original Honey).

Incinerate about 1 Gm. of Honey, accurately weighed, in a platinum crucible, in small portions at a time; not more than 0.3 per cent. of ash remains.

Separate portions of 5 mils each of a filtered aqueous solution of Honey (1 in 5) acidified with nitric acid, are not rendered more than slightly opalescent by the addition of a few drops of silver nitrate T.S. (*chlorides*), nor more than slightly cloudy by a few drops of barium chloride T.S. (*sulphates*).

Boil about 2 Gm. of Honey with 10 mils of distilled water; the resulting solution, when cold, is not rendered blue, green or reddish on the addition of iodine T.S. (*starch or dextrins*).

The color of an aqueous solution of Honey (1 in 2) is not changed at once when mixed with an equal volume of ammonia water (*foreign coloring matter*); 5 mils of an aqueous solution of Honey (1 in 2) does not at once acquire a red or rose color on the addition of a few drops of hydrochloric acid (*azo dyes*).

A solution of 10 Gm. of Honey in 50 mils of distilled water requires not more than 0.5 mil of normal potassium hydroxide V.S. for neutralization, phenolphthalein T.S. being used as indicator.

Triturate about 1 Gm. of Honey with 20 mils of ether in a mortar, filter it into a porcelain dish or crucible, allow the filtrate to evaporate and add to the residue one drop of resorcinol T.S. At most only a pink color may be produced, which disappears in half a minute, but not an orange, cherry, or brown-red color (*artificial or added invert sugar*).

Preparation—Mel Depuratum.

MEL DEPURATUM

Clarified Honey

Mel Depurat.

HONEY, *a convenient quantity,*
DISTILLED WATER,
GLYCERIN, each, *a sufficient quantity.*

Weigh the honey in a tared dish, mix it intimately with *two per cent.* of paper pulp, which has been previously reduced to shreds, thoroughly washed and soaked in water, and then strongly expressed and again shredded. Then heat on a water bath at a temperature not exceeding 70° C., and carefully remove the scum which rises to the surface. Add enough distilled water to make up the loss incurred by evaporation, strain, and mix the strained liquid with *five per cent.* of its weight of glycerin.

Clarified Honey, diluted with twice its weight of water, has a specific gravity of not less than 1.095 at 25° C.; in other respects it conforms to the tests for purity under *Mel.*

Preparation—Mel Rosæ.

MEL ROSÆ

Honey of Rose

FLUIDEXTRACT OF ROSE, *one hundred and twenty milliliters*	120 mils
CLARIFIED HONEY, *a sufficient quantity,*	
To make *one thousand grammes*............	1000 Gm.

Mix the fluidextract of rose in a tared vessel with enough clarified honey to make the product weigh *one thousand grammes.*

AVERAGE DOSE—Metric, 4 mils—Apothecaries, 1 fluidrachm.

MENTHA PIPERITA

Peppermint

Menth. Pip.

The dried leaves and flowering tops of *Mentha piperita* Linné (Fam. *Labiatæ*).

Leaves more or less crumpled and frequently detached from the stems; stems quadrangular, from 1 to 2 mm. in diameter, glabrous except for a few scattered deflexed hairs; leaves when entire ovate-oblong to oblong-lanceolate, petioles from 4 to 15 mm. in length, slightly pubescent, laminæ from 1 to 9 cm. in length, acute and sharply serrate, light green to purplish-brown, upper surfaces nearly glabrous, lower surfaces glandular hairy, especially on the veins; flower-whorls in oblong or oval spikes which are usually compact, or somewhat interrupted at the base, from 1 to 1.5 cm. in breadth, rounded at the summit, and in fruit attaining a length of from 3 to 7 cm.; bracts oblong-lanceolate, very acuminate, 7 mm. in length; calyx tubular, equally 5-toothed, pubescent and glandular-punctate, often dark purple in color; corolla tubular-campanulate, 4-cleft, about 3 mm. in length and often light purple; stamens 4, short and equal; nutlets ellipsoidal, about 0.5 mm. in diameter, blackish-brown; odor aromatic, characteristic; taste aromatic, pungent, followed by a cooling sensation in the mouth.

Preparation—Spiritus Menthæ Piperitæ.

Average dose—Metric, 4 Gm.—Apothecaries, 60 grains.

MENTHA VIRIDIS

Spearmint

Menth. Vir.

The dried leaves and flowering tops of *Mentha spicata* Linné (*Mentha viridis* Linné) (Fam. *Labiatæ*).

Leaves more or less crumpled and mixed with a large proportion of the light brown or purplish-colored stems, occasionally with their characteristic opposite branches; stems distinctly quadrangular, from 1 to 3 mm. in width, nearly glabrous; leaves when entire ovate-lanceolate, unequally serrate, nearly sessile or with a petiole less than 5 mm. in length, of a bright green color and somewhat glandular-hairy on the under surface; flowers arranged in opposite clusters and in more or less interrupted or crowded lanceolate, nearly acute spikes; bracts linear-lanceolate, subulate, from 7 to 10 mm. in length, subtending the flower clusters; calyx tubular, 5-toothed, glandular punctate and somewhat pubescent near the teeth; corolla nearly white or light brown; stamens extending beyond the corolla tube; odor slightly pungent, characteristic; taste aromatic, characteristic but not followed by a cooling sensation in the mouth.

Preparation—Spiritus Menthæ Viridis.

Average dose—Metric, 4 Gm.—Apothecaries, 60 grains.

MENTHOL

Menthol

A secondary alcohol [$C_{10}H_{19}OH = 156.16$] obtained from oil of peppermint or other mint oils. Preserve it in well-closed containers, in a cool place.

Menthol occurs in colorless, acicular or prismatic crystals, having a strong odor and taste of peppermint; when tasted it produces a sensation of warmth followed by cold when air is drawn into the mouth.

Menthol is slightly soluble in water; very soluble in alcohol, chloroform, ether or in petroleum benzin; freely soluble in liquid petrolatum or fixed or volatile oils.

Its alcoholic solution is neutral to litmus, and is lævorotatory.

It melts between 42° and 44° C.

When Menthol is triturated with about an equal weight of camphor, thymol, or hydrated chloral, the mixture becomes liquid.

Heat about 2 Gm. of Menthol in an open dish, on a water bath; it gradually volatilizes without leaving more than 0.05 per cent. of residue (*wax, paraffin, or inorganic substances*).

Dissolve a few crystals of Menthol in 1 mil of glacial acetic acid and then add 3 drops of sulphuric acid and 1 drop of nitric acid; no green color is produced (*thymol*).

AVERAGE DOSE—Metric, 0.06 Gm.—Apothecaries, 1 grain.

METHYLIS SALICYLAS

Methyl Salicylate

Methyl. Salicyl.—Oleum Gaultheriæ, U.S.P. VIII Oil of Wintergreen Oleum Betulæ, U.S.P. VIII Oil of Sweet Birch Oil of Teaberry

It contains not less than 98 per cent. of $CH_3C_7H_5O_3$ (152.06). It is produced synthetically or is obtained by distillation from *Gaultheria procumbens* Linné (Fam. *Ericaceæ*) or from *Betula lenta* Linné (Fam. *Betulaceæ*). The label must indicate whether the methyl salicylate has been made synthetically or distilled from either of the above mentioned plants. Preserve it in well-stoppered, amber-colored bottles, in a cool place, protected from light.

It is a colorless, yellowish or reddish liquid, having the characteristic odor and taste of gaultheria.

It is sparingly soluble in water; miscible with alcohol and glacial acetic acid. It is soluble in 6 volumes of 70 per cent. alcohol at 25° C. with not more than a slight cloudiness.

The alcoholic solution is neutral or slightly acid to moistened litmus paper.

Specific gravity at 25° C.: synthetic, 1.180 to 1.185; when from sweet birch or gaultheria, 1.172 to 1.182.

It boils between 218° and 221° C.

Synthetic Methyl Salicylate, or that from sweet birch, is optically inactive; when obtained from gaultheria, it is slightly lævorotatory, not exceeding −1.5° in a 100 mm. tube at 25° C.

A deep violet color is produced by shaking a drop of Methyl Salicylate with about 5 mils of distilled water and adding a drop of ferric chloride T.S.

Add 10 mils of potassium hydroxide T.S. to 1 mil of Methyl Salicylate, contained in a capacious test tube, and agitate the mixture. A clear, or slightly cloudy, colorless or faintly yellowish solution results without the separation of any oily drops either on the surface or at the bottom of the liquid (*other volatile oils or petroleum products*).

It does not respond to the Test for heavy metals in volatile oils (see Part II, Test No. 3).

Assay—Introduce about 2 mils of Methyl Salicylate into a tared flask, note the exact weight, add 50 mils of half-normal alcoholic potassium hydroxide V.S., connect the flask with a reflux condenser and heat the mixture on a water bath during two hours. Then add a few drops of phenolphthalein T.S. and titrate the excess of alkali with half-normal hydrochloric acid V.S. It shows not less than 98 per cent. of $CH_3C_7H_5O_3$.

Each mil of half-normal alcoholic potassium hydroxide V.S. consumed corresponds to 0.07603 Gm. of $CH_3C_7H_5O_3$. Each gramme of Methyl Salicylate corresponds to not less than 12.9 mils of half-normal alcoholic potassium hydroxide V.S.

AVERAGE DOSE—Metric, 0.75 mil—Apothecaries, 12 minims.

METHYLTHIONINÆ CHLORIDUM

Methylthionine Chloride

Methylthionin. Chlor.—Methylthioninæ Hydrochloridum, U.S.P. VIII
Methylene Blue

Tetramethylthionine chloride [$C_{16}H_{18}N_3ClS+3H_2O=373.75$].

Methylthionine Chloride occurs as a dark green, crystalline powder, or in prismatic crystals having a lustre resembling bronze.

Methylthionine Chloride is freely soluble in water and alcohol; soluble in chloroform; the solutions have a deep blue color.

The addition of hydrochloric acid to its aqueous solution changes the color to a lighter shade of blue.

The addition of sodium hydroxide T.S. to its aqueous solution changes the color to a purplish shade, and, if added in excess, produces on standing a precipitate having a dull violet color.

A solution of Methylthionine Chloride in diluted sulphuric acid is gradually decolorized upon the addition of zinc dust.

Incinerate about 0.5 Gm. of Methylthionine Chloride; not more than 1 per cent. of ash remains.

Intimately mix 0.2 Gm. of Methylthionine Chloride with about 0.5 Gm. each of potassium nitrate and anhydrous sodium carbonate and heat the powdered mixture in a crucible until the organic matter is completely oxidized. Then dissolve the cooled residue in 15 mils of diluted sulphuric acid and evaporate the solution over a flame until vapors of sulphuric acid begin to evolve. The residue so obtained meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Heat about 0.5 Gm. of Methylthionine Chloride at a temperature below a red heat until it is completely carbonized, boil the powdered residue with 10 mils of diluted hydrochloric acid for five minutes, filter the liquid and wash the residue with 10 mils of distilled water. The combined liquids, when boiled with 1 mil of nitric acid, and supersaturated with ammonia water and filtered, if necessary, remain clear upon the addition of an equal volume of hydrogen sulphide T.S. (*zinc*).

Dissolve 1 Gm. of Methylthionine Chloride in 50 mils of boiling alcohol, filter through counter-balanced filters, wash the residue on the filter with boiling alcohol until the washings cease to be colored blue, and dry it at 100° C. The weight corresponds to not more than 1 per cent. (*dextrin*).

Average dose—Metric, 0.15 Gm.—Apothecaries, 2½ grains.

MEZEREUM

Mezereum

Mezereon

The dried bark of *Daphne Mezereum* Linné, *Daphne Gnidium* Linné, or of *Daphne Laureola* Linné (Fam. *Thymeleaceæ*).

In flexible, tough quilled pieces or somewhat flattened strips, attaining a length of 90 cm.; from 0.3 to 1 mm. in thickness; outer surface yellowish- or olive-brown (*D. Mezereum*) or purplish-brown (*D. Gnidium*) or purplish-gray (*D. Laureola*), smooth, numerous lenticels giving a transversely striated appearance and occasionally with numerous, circular, brownish-black apothecia; outer corky layer easily separable from the middle bark which varies from light green to olive-brown and with more or less detached bast-fibers; inner surface yellowish-white, satiny lustrous, finely striate; fracture tough, fibrous, the inner bark lamellated; odor very slight; taste at first slight, becoming gradually and increasingly pungent and acrid.

Under the microscope, transverse sections of Mezereum show a rather thick cork composed of from 20 to 30 rows of cells, the outer being compressed and with yellowish-brown walls, and the inner more or less tabular with nearly colorless walls; a hypodermis of 3 to 5 rows of collenchymatous cells containing chloroplastids or a yellowish-green resinous substance; an inner bark consisting mostly of nearly colorless non-lignified bast-fibers occurring in loosely united groups, and a few starch-bearing medullary rays one cell in width.

The powder is light grayish-brown; bast-fibers numerous, from 0.4 to 3 mm. in length and about 0.015 mm. in width, frequently more or less uneven or irregularly bent and considerably attenuated at the ends, the walls being from 0.001 to 0.005 mm. in thickness, colorless, non-lignified and free from pores; fragments of yellowish-brown cork cells and starch-bearing medullary rays; starch grains relatively few, mostly spherical or elliptical, occasionally 2- to 4-compound, the individual grains from 0.003 to 0.015 mm. in diameter.

Preparation—Fluidextractum Sarsaparillæ Compositum.

MISTURA CRETÆ

Chalk Mixture

Mist. Cret.

Compound Chalk Powder, *twenty grammes*............	20 Gm.
Cinnamon Water, *forty milliliters*......................	40 mils
Water, *a sufficient quantity,*	
To make *one hundred milliliters*............	100 mils

Gradually add the cinnamon water and about *twenty mils* of water to the compound chalk powder in a mortar, triturating until the mixture is uniform; transfer this to a graduated vessel, rinse the mortar with enough water to make the product measure *one hundred mils*, and mix the whole thoroughly. This preparation must not be dispensed unless it has been recently prepared.

Average dose—Metric, 15 mils—Apothecaries, 4 fluidrachms.

MISTURA GLYCYRRHIZÆ COMPOSITA

Compound Mixture of Glycyrrhiza

Mist. Glycyrrh. Co.—Brown Mixture

Pure Extract of Glycyrrhiza, *thirty grammes*	30.000 Gm.
Syrup, *fifty milliliters*	50.000 mils
Acacia, granulated, *thirty grammes*	30.000 Gm.
Antimony and Potassium Tartrate, *two hundred and forty milligrammes*	0.240 Gm.
Camphorated Tincture of Opium, *one hundred and twenty milliliters*	120.000 mils
Spirit of Nitrous Ether, *thirty milliliters*	30.000 mils
Water, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Rub the pure extract of glycyrrhiza and acacia in a mortar with *five hundred mils* of warm water until they are dissolved. Allow the solution to cool, transfer it to a graduated vessel, add the antimony and potassium tartrate, dissolved in twelve mils of hot water, then the other ingredients and rinse the mortar with enough water to make the product measure *one thousand mils*. Mix the whole thoroughly.

Average dose—Metric, 10 mils—Apothecaries, 2½ fluidrachms.

MORPHINA

Morphine

An alkaloid [$C_{17}H_{19}O_3N+H_2O=303.18$] obtained from opium. Preserve it in well-closed containers, protected from light.

Morphine occurs in colorless or white, shining, rhombic prisms, in fine needles, or as a crystalline powder; odorless; permanent in the air.

One Gm. of Morphine dissolves in 3340 mils of water, 210 mils of alcohol, 1220 mils of chloroform, 6250 mils of ether, and in 100 mils of lime water, at 25° C.;

also in 1075 mils of boiling water and 98 mils of boiling alcohol; insoluble in benzene.

A saturated aqueous solution of Morphine is alkaline to litmus.

One mil of sulphuric acid added to about 0.05 Gm. of Morphine produces either no color or at most only a red or yellow tint; on heating, a brown color is developed.

Sulphuric acid containing 0.005 Gm. of selenous acid in each mil gives with Morphine a blue color, changing to green and then to brown. (Codeine yields a green color, changing to blue, and afterwards to grass-green; narcotine gives a green color, changing to brown and then to cherry-red.)

Nitric acid produces with Morphine an orange-red color fading to yellow. Sulphuric acid containing 0.005 Gm. of molybdic acid in each mil gives a purple color, changing to blue. Sulphuric acid containing in each mil one drop of solution of formaldehyde yields an intense, purple color.

Add a few drops of ferric chloride T.S. to a neutral solution of Morphine (1 in 100), made by the careful addition of diluted sulphuric acid; a blue color is produced, which is destroyed by acids, alcohol, or by heating.

Morphine solutions, when mixed with an aqueous solution of potassium ferricyanide containing a drop of ferric chloride T.S., yield deep blue solutions from which, after standing, a blue precipitate separates (difference from *codeine*).

Morphine loses not more than 6.5 per cent. of its weight when dried to constant weight at 100° C. (*moisture*).

No weighable ash remains on incinerating 0.5 Gm. of Morphine.

Dissolve about 0.1 Gm. of Morphine in 10 mils of diluted hydrochloric acid; no red coloration is produced by the addition of a few drops of ferric chloride T.S. (*meconic acid or meconates*).

Warm about 0.2 Gm. of Morphine with 4 mils of potassium hydroxide T.S.; the odor of ammonia is not noticeable (*ammonium salts*).

Dissolve 1 Gm. of Morphine in 10 mils of sodium hydroxide T.S., shake out the solution with three successive portions of 15, 10, and 10 mils of chloroform, passing the chloroform solutions through a small filter previously moistened with chloroform. Evaporate carefully the combined chloroform solutions to dryness on a water bath, dissolve the residue in 10 mils of fiftieth-normal sulphuric acid V.S., add a few drops of methyl red T.S. and titrate the excess of acid with fiftieth-normal potassium hydroxide V.S. Not less than 7.5 mils of the latter is required (*foreign alkaloids*).

AVERAGE DOSE—Metric, 0.008 Gm.—Apothecaries, 1/8 grain.

MORPHINÆ HYDROCHLORIDUM

Morphine Hydrochloride

Morph. Hydrochl.—Morphine Chloride

The hydrochloride [$C_{17}H_{19}O_3N.HCl+3H_2O=375.68$] of the alkaloid morphine. Preserve it in well-closed containers protected from light.

Morphine Hydrochloride occurs in white, silky, glistening needles or cubical masses, or as a white, crystalline powder; odorless; permanent in the air.

One Gm. of Morphine Hydrochloride dissolves in 17.5 mils of water and 52 mils of alcohol at 25° C.; also in 0.5 mil of boiling water and 46 mils of alcohol at 60° C.; soluble in glycerin; insoluble in chloroform or ether.

Its aqueous solution (1 in 20) is neutral or slightly acid to litmus.

Silver nitrate T.S., when added to an aqueous solution of the salt, produces a white precipitate insoluble in nitric acid.

Add potassium carbonate T.S. to 5 mils of an aqueous solution of the salt (1 in 30), a white precipitate is produced, which does not become green on exposure to air nor yield a color to chloroform when shaken with it (*apomorphine*).

Morphine Hydrochloride loses not more than 15 per cent. of its weight when dried to constant weight at 100° C. (*moisture*).

In all other respects the salt responds to the tests for identity and purity under *Morphina*.

AVERAGE DOSE—Metric, 0.008 Gm.—Apothecaries, ⅛ grain.

MORPHINÆ SULPHAS

Morphine Sulphate

Morph. Sulph.

The sulphate [$(C_{17}H_{19}O_3N)_2.H_2SO_4+5H_2O=758.49$] of the alkaloid morphine. Preserve it in well-closed containers, protected from light.

Morphine Sulphate occurs in white, feathery, acicular, silky crystals, or in cubical masses; odorless, permanent in the air.

One Gm. of Morphine Sulphate dissolves in 15.5 mils of water and 565 mils of alcohol at 25° C.; also in 0.7 mil of water at 80° C. and 240 mils of alcohol at 60° C.; insoluble in chloroform or ether.

Its aqueous solution (1 in 20) is neutral or slightly acid to litmus.

Barium chloride T.S. produces a white precipitate insoluble in hydrochloric acid when added to an aqueous solution of the salt.

Morphine Sulphate loses not more than 7.5 per cent. of its weight when dried for four hours at 100° C. (*moisture*).

In all other respects the salt responds to the tests for identity and purity under *Morphina*.

AVERAGE DOSE—Metric, 0.008 Gm.—Apothecaries, ⅛ grain.

MOSCHUS

Musk

Mosch.—Tonquin Musk Deer Musk

The dried secretion from the preputial follicles of *Moschus moschiferus* Linné (Fam. *Moschidæ*). Preserve it carefully in glass-stoppered bottles.

Usually in small irregular granules, not more than 2 mm. in thickness, blackish with a few brown fragments and becoming somewhat grayish on aging; glistening and somewhat oily; odor peculiar, penetrating, powerful and persistent; taste somewhat bitter.

Add a few granules of Musk to 2 mils of water in a watch crystal and stir with a glass rod; a light brown solution is obtained. The undissolved portion consists of irregular fragments containing a finely granular substance, numerous rod-like bacteria and occasionally the hyphæ of a fungus.

Add a drop of iodine T.S. to a few granules of Musk on a slide and examine it under the microscope; the particles are not colored blue or bluish-black (*starch*).

Add a few granules of Musk to 2 mils of alcohol contained in a watch crystal; the grains sink to the bottom, and upon stirring with a glass rod, a pale brown, slightly cloudy solution is obtained, leaving a somewhat oily stain upon the upper portion of the watch crystal as the alcohol evaporates; the undissolved portion or residue resembles that obtained with the aqueous mixture, except that the particles are less disintegrated.

Add a few granules of Musk to 2 mils of chloroform in a watch crystal; the grains float on the surface and upon stirring with a glass rod, the solution remains nearly colorless, and as it evaporates there separates around the particles a small quantity of a whitish, oily or fatty substance.

Not less than 50 per cent. of Musk is soluble in water, the solution having a strong, distinctly characteristic odor, and a slightly acid reaction.

Not less than 10 per cent. of Musk is soluble in alcohol, the solution being of a light, yellowish-brown color and becoming slightly turbid upon the addition of water.

Musk loses not more than 15 per cent. of moisture when dried to constant weight in a desiccator over sulphuric acid.

Musk yields not more than 8 per cent. of ash.

Preparation—Tinctura Moschi.

AVERAGE DOSE—Metric, 0.25 Gm.—Apothecaries, 4 grains.

MUCILAGO ACACIÆ

Mucilage of Acacia

Mucil. Acac.

ACACIA, in small fragments, *three hundred and fifty grammes*	350 Gm.
DISTILLED WATER, *a sufficient quantity,*	
To make *one thousand grammes*............	1000 Gm.

Place the acacia in a tared bottle or flask having a capacity not exceeding *one thousand mils,* wash the drug with cold water, allow it to drain, and then add enough warm distilled water to make the mixture weigh *one thousand grammes.* Securely stopper the container, and agitate it from time to time until the acacia is dissolved. Strain the Mucilage and preserve it in small, well-filled bottles in a refrigerator or in a cool place.

Mucilage of Acacia should be frequently made and must not be dispensed if it has become sour or moldy.

AVERAGE DOSE—Metric, 15 mils—Apothecaries, 4 fluidrachms.

MUCILAGO TRAGACANTHÆ

Mucilage of Tragacanth

Mucil. Trag.

TRAGACANTH, *six grammes*..........................	6 Gm.
GLYCERIN, *eighteen grammes*..........................	18 Gm.
WATER, *a sufficient quantity,*	
To make *one hundred grammes*..............	100 Gm.

Mix the glycerin with *seventy-five mils* of water in a tared vessel, heat the mixture to boiling, remove the heat, add the tragacanth, and macerate during twenty-four hours, stirring occasionally. Then add enough water to make the mixture weigh *one hundred grammes*, beat it until of a uniform consistence, and strain it forcibly through muslin.

MYRISTICA

Myristica

Myrist.—Nutmeg

The ripe seeds of *Myristica fragrans* Houttuyn (Fam. *Myristicaceæ*), deprived of the arilli and seed-coats. Preserve the kernels in tightly-closed containers, adding a few drops of carbon tetrachloride or chloroform from time to time to prevent attack by insects. Reject broken or wormy kernels.

Ovoid or ellipsoidal, from 20 to 30 mm. in length and about 20 mm. in thickness; externally light brown to dark brown, reticulately furrowed, the broad end with a large, circular, upraised scar from which arises a furrow extending to the chalaza; easily cut, the surface having a waxy lustre and mottled by reason of the light brown perisperm penetrating into the yellowish-brown endosperm; a longitudinal section through the endosperm above the large scar shows a small irregular cavity with the more or less shrunken remains of the embryo, and usually containing a growth of mold; odor and taste agreeably aromatic.

The powder is dark reddish-brown; consisting of irregular, yellowish-brown or brownish-black fragments; fragments of perisperm yellowish-brown with large, circular or elliptical oil reservoirs containing a volatile oil, small, thin-walled parenchyma cells, and occasional spiral tracheæ; parenchyma cells of endosperm more or less polygonal and filled with starch grains and aleurone grains; starch grains single or compound, the individual grains being spherical, plano-convex or polygonal, from 0.003 to 0.02 mm. in diameter and colored blue with iodine T.S. (distinction from starch grains in mace, which are colored yellowish-red); mounts in hydrated chloral T.S. show numerous globules of a fixed oil which later may separate in the form of rod-like crystals; mounts in fixed oil show the separation of spheroidal aggregates of crystals which polarize light strongly. The powder made from "limed" nutmegs shows under the microscope, upon the addition of water containing 25 per cent. of sulphuric acid, the immediate separation of crystals of calcium sulphate in the form of small needles or short rods which do not polarize light.

Myristica yields not more than 5 per cent. of ash.

Average dose—Metric, 0.5 Gm.—Apothecaries, 8 grains.

MYRRHA

Myrrh

Myrrh.—Gum Myrrh

A gum-resin obtained from one or more species of *Commiphora* (Fam. *Burseraceæ*).

In rounded or irregular tears or masses, brownish-yellow or reddish-brown, and covered with a brownish-yellow dust; fracture waxy, somewhat splintery, translucent on the edges, sometimes marked with nearly white lines; odor balsamic; taste aromatic; bitter and acrid.

The powder is yellowish-brown; 0.001 Gm. of the powder, when added to a drop of fixed oil on a slide and examined under the microscope, shows numerous angular fragments varying in color from pale yellow to yellowish-brown; when mounted in hydrated chloral T.S. the color of the yellowish fragments is intensified; the addition of iodine T.S. to the powder, previously mounted in hydrated chloral T.S., may show the presence of a few starch grains varying in shape from spherical, polygonal, and narrowly ellipsoidal to somewhat pear-shaped, from 0.01 to 0.035 mm. in diameter; when mounted in phloroglucinol T.S. and hydrochloric acid the powder may show a few fragments of lignified tissues consisting of either sclerenchymatous fibers, or of small groups of stone cells, the individual cells of the latter with very thick, porous walls and from 0.015 to 0.05 mm. in length.

Not less than 35 per cent. of Myrrh is soluble in alcohol.

Myrrh yields not more than 8.5 per cent. of ash.

Preparations—Pilulæ Rhei Compositæ Tinctura Myrrhæ.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

NITROGENII MONOXIDUM

Nitrogen Monoxide

Nitrogen. Monox.—Nitrous Oxide

Nitrogen Monoxide gas [$N_2O = 44.02$].

It is a colorless gas possessing a slight characteristic odor and a somewhat sweet taste. It supports the combustion of many substances.

For convenience in handling and use, it is compressed in metal cylinders. It is quite soluble in water at low temperatures; 1 volume of water dissolves about 1.3 volumes of nitrous oxide at 25° C.

Pass 2000 mils of the gas, measured under normal atmospheric pressure at about 25° C., through 100 mils of barium hydroxide T.S. at a rate not exceeding 4000 mils per hour; not more than a slight turbidity is produced (*carbon dioxide*).

No opalescence is produced in a mixture of 100 mils of distilled water and 1 mil of silver nitrate T.S. by 2000 mils of the gas under the conditions described above (*halogens*).

No change in color is produced in 100 mils of distilled water to which 5 drops of litmus T.S. have been added, by the passage of 1000 mils of the gas through the liquid under the conditions described above (*acids or bases*).

No alteration in color is produced in a solution of 0.2 mil of tenth-normal potassium permanganate V.S. in 100 mils of distilled water, by the passage of 1000 mils of the gas through the liquid under the conditions described above (*reducing substances*).

NUX VOMICA

Nux Vomica

Nux Vom.—Strychni semen P.I.

The dried, ripe seeds of *Strychnos Nux-vomica* Linné (Fam. *Loganiaceæ*), yielding not less than 2.5 per cent. of the alkaloids of Nux Vomica.

Orbicular, nearly flat, occasionally irregularly bent, from 10 to 30 mm. in diameter and from 4 to 5 mm. in thickness, very hard when dry; externally grayish or greenish-gray, covered with appressed hairs giving it a silky luster, hilum indicated by a circular scar at the center of one of the flattened sides and connected with the micropyle at the edge by a ridge; internally showing a thin, hairy seed-coat and a large grayish-white endosperm at one end of which is embedded a small embryo with two broadly ovate, 5- to 7-nerved cotyledons; inodorous; taste intensely and persistently bitter.

The powder is light gray; consisting chiefly of thick-walled endosperm cells containing globules of a fixed oil and a few small aleurone grains, and fragments of strongly lignified, non-glandular hairs, the walls of the latter possessing large, circular, or long, slit-like pores. In the tissues of the adhering pulp occur a few small, nearly spherical starch grains.

Nux Vomica yields not more than 3.5 per cent. of ash.

Assay—Introduce 15 Gm. of Nux Vomica, in No. 40 powder, into a 250 mil flask and add 150 mils of a mixture of chloroform, 1 volume, and ether, 2 volumes. Stopper the flask, shake it well and allow it to stand ten minutes, then add 10 mils of ammonia water, and, after shaking the flask vigorously every ten minutes during two hours, allow it to stand ten hours. Now add 25 mils of distilled water, again shake the flask well, and, when the drug has settled, decant 100 mils of the solution, representing 10 Gm. of Nux Vomica, and proceed as directed under Belladonnæ Radix, page 73, beginning with the word "Filter," line 7 of the Assay. For the titration, dissolve the alkaloids from the residue with 10 mils of tenth-normal sulphuric acid V.S. instead of 5 mils. Each mil of tenth-normal sulphuric acid V.S. consumed corresponds to 36.4 milligrammes of the total alkaloids of Nux Vomica.

Preparations—Extractum Nucis Vomicæ Fluidextractum Nucis Vomicæ Tinctura Nucis Vomicæ.

Average dose—Metric, 0.06 Gm.—Apothecaries, 1 grain.

OLEATUM HYDRARGYRI

Oleate of Mercury

Oleat. Hydrarg.

Yellow Mercuric Oxide, in very fine powder, *twenty-five grammes*	25 Gm.
Alcohol, *twenty milliliters*	20 mils
Oleic Acid, *a sufficient quantity,*	
To make *one hundred grammes*	100 Gm.

Mix the yellow mercuric oxide with the alcohol in a tared dish, add *seventy-five grammes* of oleic acid, warm the mixture to a temperature not exceeding 50° C., stir constantly for five minutes and then continue the heat, stirring frequently, until the alcohol is expelled and the mercuric oxide is dissolved. Now add sufficient oleic acid to make the product weigh *one hundred grammes* and mix thoroughly. Preserve Oleate of Mercury in tightly-closed containers protected from strong light and do not dispense it if globules of mercury are visible at the bottom of the container. In the preparation of this Oleate avoid all contact with metallic utensils.

OLEORESINA ASPIDII

Oleoresin of Aspidium

Oleores. Aspid.—Oleoresin of Male Fern

Aspidium, recently reduced to No. 40 powder, *five hundred grammes*	500 Gm.
Ether, *a sufficient quantity.*	

Place the aspidium in a cylindrical glass percolator, provided with a stop-cock, and arranged with a cover and a receptacle suitable for volatile liquids. Pack the powder firmly, and percolate slowly with ether, added in successive portions, until the drug is exhausted. Recover the greater part of the ether from the percolate by distillation on a water bath, and, having transferred the residue to a dish, allow the remaining ether to evaporate spontaneously in a warm place. Keep the Oleoresin in a well-stoppered bottle.

Note.—Oleoresin of Aspidium, on standing, usually deposits a granular, crystalline substance. This should be thoroughly mixed with the liquid portion before use.

Average dose—Caution! Single dose, once a day, Metric, 2 Gm.—Apothecaries, 30 grains.

OLEORESINA CAPSICI

Oleoresin of Capsicum

Oleores. Capsic.

Capsicum, in No. 40 powder, *five hundred grammes*	500 Gm.
Ether, *a sufficient quantity.*	

Place the capsicum in a cylindrical glass percolator, provided with a stop-cock, and arranged with a cover and a receptacle suitable for volatile liquids. Pack the powder firmly, and percolate slowly with ether, added in successive portions, until the percolate measures *eight hundred mils.* Recover the greater part of the ether from the percolate by distillation on a water bath, and, having transferred the residue to a dish, allow the remaining ether to evaporate spontaneously in a warm place. Then pour off the liquid portion, transfer the remainder to a glass funnel provided with a pledget of cotton, and, when the separated fatty matter (which is to be rejected) has been completely drained, mix the liquid portions together. Keep the Oleoresin in a well-stoppered bottle

Preparation—Emplastrum Capsici.

Average dose—Metric, 0.03 Gm.—Apothecaries, ½ grain.

OLEORESINA CUBEBÆ

Oleoresin of Cubeb

Oleores. Cubeb.

CUBEB, in No. 30 powder, *five hundred grammes*..........	500 Gm.
ALCOHOL, *a sufficient quantity*.	

Place the cubeb in a cylindrical glass percolator, pack the powder firmly, and percolate slowly with alcohol, added in successive portions, until the drug is exhausted. Recover the greater part of the alcohol from the percolate by distillation on a water bath, and, having transferred the residue to a dish, allow the remaining alcohol to evaporate, in a warm place, stirring frequently. Keep the Oleoresin in a well-stoppered bottle.

NOTE—Oleoresin of Cubeb, after standing for some time, deposits a waxy and crystalline precipitate, which should be rejected, the liquid portion only being used.

Preparation—Trochisci Cubebæ.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

OLEORESINA PETROSELINI

Oleoresin of Parsley Fruit

Oleores. Petrosel.—Liquid Apiol

PARSLEY FRUIT, in No. 60 powder, *five hundred grammes*....	500 Gm.
ETHER, *a sufficient quantity*.	

Place the parsley fruit in a cylindrical glass percolator provided with a stop-cock and arranged with a cover and a receptacle suitable for volatile liquids. Pack the powder firmly, and percolate slowly with ether, added in successive portions until the drug is exhausted. Recover the greater portion of the ether by distillation on a water bath, and, having transferred the residue to a dish, remove the remaining ether by spontaneous evaporation in a warm place, stirring frequently. Allow the Oleoresin to stand without agitation for four or five days, decant the clear liquid portion from any solid residue, and preserve it in well-stoppered bottles.

AVERAGE DOSE—Metric, 0.5 mil—Apothecaries, 8 minims.

OLEORESINA PIPERIS

Oleoresin of Pepper

Oleores. Piper.

Pepper, in No. 40 powder, *five hundred grammes*	500 Gm.
Ether, *a sufficient quantity.*	

Place the pepper in a cylindrical glass percolator, provided with a stop-cock, and arranged with a cover and a receptacle for volatile liquids. Pack the powder firmly, and percolate slowly with ether, added in successive portions, until the drug is exhausted. Recover the greater part of the ether from the percolate by distillation on a water bath, and, having transferred the residue to a dish, set this aside in a warm place until the remaining ether has evaporated, and the deposition of piperine has ceased. Lastly, separate the Oleoresin from the piperine by straining through purified cotton. Keep the Oleoresin in a well-stoppered bottle.

Average dose—Metric, 0.03 Gm.—Apothecaries, ½ grain.

OLEORESINA ZINGIBERIS

Oleoresin of Ginger

Oleores. Zingib.

Ginger, in No. 60 powder, *five hundred grammes*	500 Gm.
Ether, *a sufficient quantity.*	

Place the ginger in a cylindrical glass percolator, provided with a stop-cock, and arranged with a cover and a receptacle suitable for volatile liquids. Pack the powder firmly, and percolate slowly with ether, added in successive portions, until the drug is exhausted. Recover the greater part of the ether from the percolate by distillation on a water bath, and, having transferred the residue to a dish, allow the remaining ether to evaporate spontaneously in a warm place. Keep the Oleoresin in a well-stoppered bottle.

Average dose—Metric, 0.03 Gm.—Apothecaries, ½ grain.

OLEUM AMYGDALÆ AMARÆ

Oil of Bitter Almond

Ol. Amygd. Amar.—Bitter Almond Oil

A volatile oil obtained by maceration and distillation from the ripe kernels of *Prunus Amygdalus amara* DeCandolle (Fam. *Rosaceæ*), and from other kernels containing amygdalin. It yields not less than 85 per cent. of benzaldehyde [C_7H_6O] and not less than 2 per cent. nor more than 4 per cent. of hydrocyanic acid [HCN]. The botanical source from which it is derived must be stated on the label. Preserve it in small, well-stoppered, completely filled, amber-colored bottles protected from light and air. Oil showing crystals of benzoic acid must not be dispensed.

NOTE—This Oil is intended for medicinal use; it must not be used for flavoring foods.

Oil of Bitter Almond is a clear, colorless or yellow, strongly refractive liquid, having the characteristic odor and taste of benzaldehyde.

It is slightly soluble in water and soluble in all proportions in alcohol or ether. It dissolves, forming a clear solution, in 2 volumes of 70 per cent. alcohol.

Specific gravity: 1.038 to 1.060 at 25° C.

Refractive index: 1.5428 to 1.5439 at 20° C. (see Part II, Test No. 22).

It is optically inactive or dextrorotatory, not exceeding +0° 10′ in a 100 mm. tube at 25° C. (see Part II, Test No. 21).

When first prepared, the Oil is neutral to litmus paper, but afterwards develops an acid reaction due to the formation of benzoic acid.

It does not respond to the Test for heavy metals in volatile oils (see Part II, Test No. 3).

Hold the looped end of a piece of clean copper wire in a non-luminous flame until it glows without coloring the flame green, cool the wire, dip the loop into Oil of Bitter Almond, ignite the latter and hold it so that the liquid burns outside of the non-luminous flame. On slowly bringing the flame from the burning Oil of Bitter Almond on the loop in contact with the lower outer edge of the non-luminous flame, no green tinge is discernible (*chlorinated products*).

Add 10 drops of the Oil to a little alcohol, then add a small amount of zinc dust and 2 mils of acetic acid and boil the mixture for a short time; no odor of phenylisocyanide develops after rendering it strongly alkaline with potassium hydroxide T.S., adding a few drops of chloroform and heating (*nitrobenzene*).

Assay for benzaldehyde—Dissolve about 3 mils of freshly redistilled phenylhydrazine in 60 mils of alcohol and titrate 25 mils of this solution, which must always be freshly prepared, with half-normal hydrochloric acid V.S., using methyl orange T.S. as indicator. To about 1 Gm. of the Oil of Bitter Almond, accurately weighed, add 25 mils of the phenylhydrazine solution just prepared and allow it to stand for thirty minutes. Add a drop of methyl orange T.S., and acidify the mixture by adding a measured excess of half-normal hydrochloric acid V.S. Filter the mixture and wash the precipitate with small portions of distilled water until the washings cease to redden blue litmus paper. Then titrate the excess of hydrochloric acid in the filtrate with half-normal potassium hydroxide V.S. and subtract the number of mils of the half-normal hydrochloric acid V.S. consumed from the number of mils of the half-normal hydrochloric acid V.S. used in titrating the 25 mils of phenylhydrazine solution; the difference multiplied by 0.053 gives the weight of benzaldehyde.

Assay for hydrocyanic acid—Dissolve 15 Gm. of crystallized magnesium sulphate in enough distilled water to measure 100 mils, add 5 mils of this solution to 40 mils of distilled water, then add 5 mils of half-normal sodium hydroxide V.S. and two drops of potassium chromate T.S., and titrate the solution with tenth-normal silver nitrate V.S. to the production of a permanent reddish tint. Pour this mixture into a 100 mil flask containing about 1 Gm. of Oil of Bitter Almond, accurately weighed, mix well and titrate again with tenth-normal silver nitrate V.S. until a red tint, which does not disappear on shaking, is reproduced. Conduct this titration as rapidly as possible.

One mil of tenth-normal silver nitrate V.S. corresponds to 0.0027 Gm. of hydrocyanic acid. One gramme of the Oil corresponds to not less than 7.4 mils nor more than 14.8 mils of tenth-normal silver nitrate V.S.

Preparations—Aqua Amygdalæ Amaræ Spiritus Amygdalæ Amaræ.

AVERAGE DOSE—Metric, 0.03 mil—Apothecaries, ½ minim.

OLEUM AMYGDALÆ EXPRESSUM

Expressed Oil of Almond

Ol. Amygd. Exp.—Oil of Sweet Almond

A fixed oil obtained from the kernels of varieties of *Prunus Amygdalus* Stokes (Fam. *Rosaceæ*). Preserve it in well-closed containers, in a cool place.

Expressed Oil of Almond is a clear, pale straw-colored or colorless, oily liquid, almost odorless, and having a bland taste.

It is slightly soluble in alcohol, miscible with ether, chloroform, benzene, or petroleum benzin.

Specific gravity: 0.910 to 0.915 at 25° C.

The oil remains clear at $-10°$ C., and does not congeal until cooled to nearly $-20°$ C. (*olive or lard oil*).

Shake vigorously 2 mils of the Oil with a mixture of 1 mil of fuming nitric acid and 1 mil of water; a whitish mixture is formed, which, after standing for several hours at about 10° C., separates into a solid white or nearly white mass and a slightly colored liquid (*oil of peach or apricot kernels*, yielding a red color, and *sesame or cottonseed oil*, yielding a brown color).

Heat 10 mils of the Oil with 15 mils of an aqueous solution of sodium hydroxide (1 in 6) and 30 mils of alcohol on a water bath in a flask having a small funnel inserted in the neck, occasionally agitating the mixture until it becomes clear, then transfer the solution to a shallow dish and evaporate the alcohol on a water bath. The residue, when mixed with 100 mils of distilled water, produces a clear solution (*paraffin oil*). Add an excess of hydrochloric acid to this solution; a layer of oleic acid rises to the surface, which, when separated, washed with warm water and clarified by heating on a water bath, remains clear if cooled to 15° C. (*various foreign oils*).

One volume of the oleic acid obtained in the last test, when mixed with 1 volume of alcohol, yields a clear solution, which at 15° C. does not deposit any fatty acids, nor become turbid upon the further addition of 1 volume of alcohol (distinction from *olive, arachis, cottonseed, sesame, or other fixed oils*).

Saponification value: not less than 191 nor more than 200 (see Part II, Test No. 9).

Iodine value: not less than 93 nor more than 100 (see Part II, Test No. 8).

Preparation—Unguentum Aquæ Rosæ.

OLEUM ANISI

Oil of Anise Oil of Star Anise

Ol. Anisi—Anise Oil

A volatile oil distilled from the ripe fruit of *Pimpinella Anisum* Linné (Fam. *Umbelliferæ*) or from the ripe fruit of *Illicium verum* Hooker filius (Fam. *Magnoliaceæ*). The botanical source from which it is derived must be stated on the label. If solid material has separated, carefully warm the Oil until liquefied, and thoroughly mix it before dispensing. Preserve it in well-stoppered, amber-colored bottles, protected from light.

Oil of Anise is a colorless or pale yellow, strongly refractive liquid, having the characteristic odor and taste of anise.

It is soluble with not more than a slight cloudiness in 3 volumes of 90 per cent. alcohol.

Specific gravity: 0.978 to 0.988 at 25° C.

Refractive index: 1.544 to 1.560 at 20° C. (see Part II, Test No. 22).

The optical rotation varies from +1° to −2° in a 100 mm. tube at 25° C. (*oil of fennel*) (see Part II, Test No. 21).

An alcoholic solution prepared as above is neutral to litmus and develops no blue or brownish color upon the addition of a drop of ferric chloride T.S. (*phenols*).

It does not respond to the Test for heavy metal in volatile oils (see Part II, Test No. 3).

When tested by the following method, the congealing point of the Oil does not fall below 15° C. Transfer about 10 mils of the Oil to a test tube, place it in a water bath cooled with ice, insert a thermometer at once into the Oil and allow it to remain undisturbed until the temperature has fallen to about 12° C. Then induce crystallization either by rubbing the inner wall of the test tube with the thermometer or by the addition of a particle of solid anethol, remove the test tube from the bath and stir during the solidification of the Oil. The highest temperature reached during the crystallization is regarded as the congealing point.

Preparations—Aqua Anisi Spiritus Anisi Tinctura Opii Camphorata.

AVERAGE DOSE—Metric, 0.2 mil—Apothecaries, 3 minims.

OLEUM AURANTII

Oil of Orange

Ol. Aurant.—Oleum Aurantii Corticis, U.S.P. VIII Orange Oil Oil of Sweet Orange

A volatile oil obtained by expression from the fresh peel of sweet orange, *Citrus Aurantium sinensis* Gallesio (Fam. *Rutaceæ*), and its varieties. Preserve it in small, well-stoppered, amber-colored bottles, in a cool place, protected from light. Oil of Orange having a terebinthinate odor is not to be dispensed.

Oil of Orange is a yellow liquid having the characteristic odor and taste of orange peel.

Specific gravity: 0.842 to 0.846 at 25° C.

Refractive index: 1.4723 to 1.4737 at 20° C. (see Part II, Test No. 22).

Its optical rotation is not less than + 94° in a 100 mm. tube at 25° C. (see Part II, Test No. 21).

Introduce 50 mils of Oil of Orange into a 200 mil, three-bulb Ladenburg flask of approximately the following dimensions: The lower or main bulb 6 cm. in diameter with the smaller condensing bulbs 3.5 cm., 3.0 cm. and 2.5 cm. in diameter, respectively; with the distance from the bottom of the flask to the side arm 20 cm. Then distil the Oil at the rate of one drop per second until 5 mils has been obtained. The angle of rotation of the distillate thus obtained is equal to or only slightly greater than that of the original Oil, and the refractive index of this portion, at 20° C., is not less than 0.0008 nor more than 0.0015 lower than that of the original Oil at 20° C.

Preparation—Spiritus Aurantii Compositus.

AVERAGE DOSE—Metric, 0.2 mil—Apothecaries, 3 minims.

OLEUM CADINUM

Oil of Cade

Ol. Cadin.—Cade Oil   Oil of Juniper Tar   Oleum Juniperi Empyreumaticum

An empyreumatic oil obtained by the dry distillation of the wood of *Juniperus Oxycedrus* Linné (Fam. *Pinaceæ*).

Oil of Cade is a dark brown, clear, thick liquid, having a tarry, empyreumatic odor and a warm, faintly aromatic, and bitter taste.

It is almost insoluble in water, but imparts to it an acid reaction. It is only partially soluble in alcohol or petroleum benzin, completely soluble in 3 volumes of ether, soluble in amyl alcohol, chloroform, glacial acetic acid, or oil of turpentine.

Specific gravity: 0.980 to 1.055 at 25° C.

Shake 1 part of Oil of Cade with 20 parts of warm distilled water and filter; separate portions of this filtrate give a red coloration with a few drops of ferric chloride solution (1 in 1000) and reduce silver ammonium nitrate T.S. in the cold and alkaline cupric tartrate T.S. on heating.

Agitate 1 mil of Oil of Cade with 15 mils of purified petroleum benzin, filter the benzin solution, add an equal volume of copper acetate solution (1 in 100), shake the mixture and then allow it to separate. On adding an equal volume of ether to the separated benzin solution, it produces no intensely green coloration and does not become colored more than light yellow to brown (*rosin and rosin oil*).

OLEUM CAJUPUTI

Oil of Cajuput

Ol. Cajup.—Cajuput Oil   Oil of Cajeput

A volatile oil distilled from the fresh leaves and twigs of several varieties of *Melaleuca Leucadendron* Linné, especially the var. *Cajeputi* Roxburgh and the var. *minor* Smith (Fam. *Myrtaceæ*). Preserve it in well-stoppered, amber-colored bottles, in a cool place.

Oil of Cajuput is a colorless or yellowish liquid having a peculiar, agreeable, distinctly camphoraceous odor, and an aromatic, slightly bitter taste.

It is soluble in 1 volume of 80 per cent. alcohol.

Specific gravity: 0.912 to 0.925 at 25° C.

Its optical rotation does not exceed −4° in a 100 mm. tube at 25° C. (see Part II, Test No. 21).

It does not respond to the Test for heavy metals in volatile oils (see Part II, Test No. 3).

Average dose—Metric, 0.5 mil—Apothecaries, 8 minims.

OLEUM CARI

Oil of Caraway

Ol. Cari—Caraway Oil

A volatile oil distilled from the fruit of *Carum Carvi* Linné (Fam. *Umbelliferæ*), and yielding not less than 50 per cent., by volume, of carvone

[$C_{10}H_{14}O = 150.11$]. Preserve it in well-stoppered, amber-colored bottles, in a cool place, protected from light.

Oil of Caraway is a colorless or pale yellow liquid, having the characteristic odor and taste of caraway.

It is soluble in 8 volumes of 80 per cent. alcohol.

Specific gravity: 0.900 to 0.910 at 25° C.

Its optical rotation varies between + 70° and + 80° in a 100 mm. tube at 25° C. (see Part II, Test No. 21).

Assay—Introduce 10 mils of the Oil into a 200 mil flask with a long graduated neck (cassia flask) by means of a pipette, add 50 mils of a saturated solution of sodium sulphite, which has been carefully rendered neutral to phenolphthalein T.S. by means of acetic acid, heat the mixture in a bath containing boiling water and shake the flask repeatedly, neutralizing the mixture from time to time by the addition of a few drops of diluted acetic acid. When no coloration appears, upon the addition of a few more drops of phenolphthalein T.S. and heating for fifteen minutes, cool, and, when the liquids have separated completely, add sufficient of the sodium sulphite solution to raise the lower limit of the oily layer within the graduated portion of the neck and note the volume of the residual liquid. This measures not more than 5 mils, indicating the presence of not less than 50 per cent., by volume, of carvone.

Preparation—Spiritus Juniperi Compositus.

AVERAGE DOSE—Metric, 0.2 mil—Apothecaries, 3 minims.

OLEUM CARYOPHYLLI

Oil of Clove

Ol. Caryoph.—Clove Oil Oil of Cloves

A volatile oil distilled from the flower-buds of *Eugenia Aromatica* (Linné) O. Kuntze, *Jambosa Caryophyllus* (Sprengel) Niedenzu (Fam. *Myrtaceæ*), and yielding not less than 82 per cent., by volume, of eugenol [$C_{10}H_{12}O_2 = 164.10$]. Preserve it in well-stoppered, amber-colored bottles, in a cool place, protected from light.

Oil of Clove is a colorless or pale yellow liquid, becoming darker and thicker by age and exposure to the air, having the characteristic odor and taste of clove.

It is soluble in 2 volumes of 70 per cent. alcohol.

Specific gravity: 1.038 to 1.060 at 25° C.

Its optical rotation does not exceed −1° 10′ in a 100 mm. tube at 25° C. (see Part II, Test No. 21).

Shake 1 mil of the Oil with 20 mils of hot distilled water; the water shows not more than a scarcely perceptible acid reaction with litmus. After cooling, pass the aqueous layer through a wetted filter; the clear filtrate, with a drop of ferric chloride T.S., yields only a transient, grayish-green color, but not a blue or violet color (*phenol*).

Assay—Introduce 10 mils of the Oil into a flask with a long graduated neck (cassia flask), add 50 mils of potassium hydroxide T.S., shake the mixture for five minutes and then heat it on a water bath during ten minutes, cool and when the liquids have separated completely, add sufficient potassium hydroxide T.S. to raise the lower limit of the oily layer within the graduated portion of the neck and note the volume of the residual liquid. This measures not more than 1.8 mils, indicating the presence of not less than 82 per cent., by volume, of eugenol.

AVERAGE DOSE—Metric, 0.2 mil—Apothecaries, 3 minims.

OLEUM CASSIÆ

Oil of Cinnamon

Ol. Cass.—Oleum Cinnamomi, U.S.P. VIII Cassia Oil

A volatile oil distilled from *Cinnamomum Cassia* (Nees) Blume (Fam. *Lauraceæ*), rectified by steam distillation and yielding not less than 80 per cent., by volume, of cinnamic aldehyde [$C_9H_8O = 132.06$]. Preserve it in well-stoppered, amber-colored bottles, in a cool place, protected from light.

Oil of Cinnamon is a yellowish or brownish liquid, becoming darker and thicker by age and exposure to the air and having the characteristic odor and taste of cinnamon.

Specific gravity: 1.045 to 1.063 at 25° C.

The optical rotation varies from $+1°$ to $-1°$ in a 100 mm. tube at 25° C. (see Part II, Test No. 21).

It does not respond to the Test for heavy metals in volatile oils (see Part II, Test No. 3).

Shake 2 mils of the Oil in a test tube with from 5 to 10 mils of purified petroleum benzin, and decant the latter; this liquid is colorless and does not assume a green color upon shaking it with an equal volume of (1 in 1000) copper acetate solution (*rosin*).

Assay—Proceed as directed under *Oleum Cari*, using 10 mils of Oil of Cinnamon. It shows not less than 80 per cent., by volume, of cinnamic aldehyde.

Preparations—Aqua Cinnamomi Spiritus Cinnamomi.

AVERAGE DOSE—Metric, 0.2 mil—Apothecaries, 3 minims.

OLEUM CHENOPODII

Oil of Chenopodium

Ol. Chenopod.—Oil of American Wormseed

A volatile oil distilled from *Chenopodium ambrosioides anthelminticum* Linné (Fam. *Chenopodiaceæ*). Preserve it in well-stoppered, amber-colored bottles, in a cool place, protected from light.

Oil of Chenopodium is a colorless or pale yellowish liquid, having a characteristic, disagreeable odor and taste.

It is soluble in 8 volumes of 70 per cent. alcohol.

Specific gravity: 0.955 to 0.980 at 25° C.

Its optical rotation varies between $-4°$ and $-10°$ in a 100 mm. tube at 25° C. (see Part II, Test No. 21).

AVERAGE DOSE—Metric, 0.2 mil—Apothecaries, 3 minims.

OLEUM CORIANDRI

Oil of Coriander

Ol. Coriand.—Coriander Oil

A volatile oil distilled from the ripe fruit of *Coriandrum sativum* Linné (Fam. *Umbelliferæ*). Preserve it in well-stoppered, amber-colored bottles, in a cool place, protected from light.

Oil of Coriander is a colorless or pale yellow liquid, having the characteristic odor and taste of coriander.

It is soluble in 3 volumes of 70 per cent. alcohol.

Specific gravity: 0.863 to 0.875 at 25° C.

The optical rotation varies from +8° to +13° in a 100 mm. tube at 25° C. (see Part II, Test No. 21).

Preparation—Syrupus Sennæ.

AVERAGE DOSE—Metric, 0.2 mil—Apothecaries, 3 minims.

OLEUM CUBEBÆ

Oil of Cubeb

Ol. Cubeb.—Cubeb Oil

A volatile oil distilled from the unripe fruit of *Piper Cubeba* Linné filius (Fam. *Piperaceæ*). Preserve it in well-stoppered, amber-colored bottles, in a cool place, protected from light.

Oil of Cubeb is a colorless or a pale green to yellowish-green liquid, having the characteristic odor and taste of cubeb.

Specific gravity: 0.905 to 0.925 at 25° C.

Its optical rotation varies from −20° to −40° in a 100 mm. tube at 25° C. (see Part II, Test No. 21).

Its alcoholic solution is neutral to litmus.

AVERAGE DOSE—Metric, 0.5 mil—Apothecaries, 8 minims.

OLEUM EUCALYPTI

Oil of Eucalyptus

Ol. Eucalypt.—Eucalyptus Oil

A volatile oil distilled from the fresh leaves of *Eucalyptus Globulus* Labillardière (Fam. *Myrtaceæ*) or from some other species of *Eucalyptus*, and yielding not less than 70 per cent., by volume, of eucalyptol (cineol) [$C_{10}H_{18}O = 154.14$]. Preserve it in well-stoppered, amber-colored bottles, in a cool place, protected from light.

Oil of Eucalyptus is a colorless or pale yellow liquid, having a characteristic, aromatic, somewhat camphoraceous odor, and a pungent, spicy, and cooling taste.

It is soluble in 4 volumes of 70 per cent. alcohol.

Specific gravity: 0.905 to 0.925 at 25° C.

Mix 2 mils of the Oil with 4 mils of glacial acetic acid and gradually add 3 mils of a saturated solution of sodium nitrite. When gently stirred, the mixture does not form crystals of phellandrene nitrite (*other eucalyptus oils containing large amounts of phellandrene*).

Assay—Measure 10 mils of the Oil, from a pipette, into a round-bottom glass dish of 50 mils capacity, which is imbedded in finely broken ice. Add 10 mils of arsenic acid T.S. and stir until precipitation is complete. When the mixture ceases to congeal further, allow it to stand for ten minutes in the ice bath. (If at this point a hard mass is formed, add 5 mils of purified petroleum benzin, and mix the mass well before proceeding with the assay.) Then transfer it immediately to a hardened filter paper, about 18.5 cm. in diameter, by means of a pliable horn spatula; spread it evenly over the surface of the paper and lay a second hardened filter paper over the top. Wrap several thicknesses of absorbent or filter paper around the hardened filters, and place the whole between the plates of a press and bring to bear all the pressure possible for about one minute. Change the outside absorbent papers and press again, repeating the operation; if necessary, until the eucalyptol arsenate is apparently dry, and separates readily when touched with a spatula. The pressing is not complete when a hard mass remains which is broken up with difficulty; and usually two changes of filter paper are required, pressing each time for about two minutes; if left too long in the press the compound may decompose. Now, transfer the compound completely by means of the horn spatula to a glass funnel inserted into a 100 mil cassia flask with a neck graduated to 10 mils into tenths. Wash the last portions of the precipitate into the flask with a stream of hot distilled water from a wash bottle, assisting the disintegration with a glass rod, place the flask in boiling water and rotate it until the compound is thoroughly broken up. Then add enough distilled water to cause the eucalyptol to rise into the neck of the flask, cool it to room temperature and read its volume. This volume, multiplied by 10, shows the percentage of eucalyptol (cineol) in the Oil.

AVERAGE DOSE—Metric, 0.5 mil—Apothecaries, 8 minims.

OLEUM FŒNICULI

Oil of Fennel

Ol. Fœnic.—Fennel Oil

A volatile oil distilled from the ripe fruit collected from cultivated varieties of *Fœniculum vulgare* Miller (Fam. *Umbelliferæ*). If wholly or partly solidified, carefully warm the Oil until liquefied and thoroughly mix it before dispensing. Preserve it in well-stoppered, amber-colored bottles, in a cool place, protected from light.

Oil of Fennel is a colorless or pale yellow liquid, having the characteristic odor and taste of fennel.

It is soluble in 8 volumes of 80 per cent. alcohol and in 1 volume of 90 per cent. alcohol, forming a solution neutral to litmus.

Specific gravity: 0.953 to 0.973 at 25° C.

The optical rotation varies from +12° to +24° in a 100 mm. tube at 25° C. (see Part II, Test No. 21).

When tested by the method under *Oleum Anisi*, with the following modifications, the congealing point of the Oil does not fall below 3° C. Cool the test tube containing the 10 mils of Oil of Fennel in a freezing mixture until the temperature has fallen to 0° C., and induce crystallization as directed.

Preparations—Aqua Fœniculi Pulvis Glycyrrhizæ Compositus Spiritus Juniperi Compositus.

AVERAGE DOSE—Metric, 0.2 mil—Apothecaries, 3 minims.

OLEUM GOSSYPII SEMINIS

Cottonseed Oil

Ol. Gossyp. Sem.—Cotton Seed Oil

A fixed oil obtained from seeds of cultivated varieties of *Gossypium herbaceum* Linné, or of other species of *Gossypium* (Fam. *Malvaceæ*). Preserve it in well-closed containers.

Cottonseed Oil is a pale yellow, oily liquid, odorless or nearly odorless, and having a bland taste.

It is slightly soluble in alcohol; miscible with ether, chloroform, petroleum benzin, or carbon disulphide.

Specific gravity: 0.915 to 0.921 at 25° C.

On cooling the Oil to a temperature below 12° C. particles of solid fat separate. At about 0° to −5° C. the Oil becomes nearly or quite solid.

Add sulphuric acid (specific gravity 1.6 to 1.7) to the Oil, preferably diluted with carbon disulphide; a reddish-brown color is rapidly produced.

Mix 2 mils of the Oil in a test tube with 2 mils of a mixture of equal volumes of amyl alcohol and a 1 per cent. solution of sulphur in carbon disulphide, and immerse the test tube to one-third of its depth in a boiling, saturated aqueous solution of sodium chloride; a red color develops in from ten to fifteen minutes.

Saponification value: not less than 190 nor more than 198 (see Part II, Test No. 9).

Iodine value: not less than 105 nor more than 114 (see Part II, Test No. 8).

OLEUM JUNIPERI

Oil of Juniper

Ol. Junip.—Juniper Oil Oil of Juniper Berries

A volatile oil distilled from the ripe fruit of *Juniperus communis*, Linné (Fam. *Pinaceæ*). Preserve it in well-stoppered, amber-colored bottles in a cool place, protected from light.

Oil of Juniper is a colorless or faintly green or yellow liquid, having the characteristic odor and taste of juniper fruit.

It is soluble in 4 volumes of alcohol with not more than a slight cloudiness.

Specific gravity: 0.854 to 0.879 at 25° C.

The optical rotation varies from 0° to −15°, in a 100 mm. tube at 25° C. (see Part II, Test No. 21).

Preparations—Spiritus Juniperi Spiritus Juniperi Compositus.

Average dose—Metric, 0.2 mil—Apothecaries, 3 minims.

OLEUM LAVANDULÆ

Oil of Lavender

Ol. Lavand.—Oleum Lavandulæ Florum, U.S.P. VIII

A volatile oil distilled from the fresh flowering tops of *Lavandula vera* De Candolle (*Lavandula officinalis* Chaix, *Lavandula spica* Linné) (Fam. *Labiatæ*). Preserve it in well-stoppered, amber-colored bottles, in a cool place, protected from light.

Oil of Lavender is a colorless or yellow liquid, having the characteristic odor and taste of lavender flowers.

It is soluble in 3 volumes of 70 per cent. alcohol.

Specific gravity: 0.875 to 0.888 at 25° C.

The optical rotation varies from $-1°$ to $-10°$ in a 100 mm. tube at 25° C. (see Part II, Test No. 21).

When shaken in a narrow glass cylinder with an equal volume of distilled water, its volume does not diminish *(alcohol)*.

Shake 20 mils of the Oil with 40 mils of 5 per cent. alcohol and, when the mixture has cleared, withdraw 30 mils of the alcoholic solution. Neutralize this with half-normal potassium hydroxide V.S., using phenolphthalein T.S. as indicator, then add 5 mils of half-normal potassium hydroxide V.S. and heat the mixture on a water bath, under a reflux condenser, during one hour. Not less than 4.7 mils of half-normal hydrochloric acid V.S. is required for neutralization (*foreign esters*).

Preparations—Spiritus Lavandulæ Tinctura Lavandulæ Composita.

Average dose—Metric, 0.2 mil—Apothecaries, 3 minims.

OLEUM LIMONIS

Oil of Lemon

Ol. Limon.—Lemon Oil

A volatile oil obtained by expression from the fresh peel of the ripe fruit of *Citrus medica Limonum* (Risso) Hooker filius (Fam. *Rutaceæ*), and yielding not less than 4 per cent. of the aldehydes from Oil of Lemon, calculated as citral [$C_{10}H_{16}O=152.13$]. Preserve it in well-stoppered, amber-colored bottles, in a cool place, protected from light. Oil of Lemon having a terebinthinate odor is not to be dispensed.

Oil of Lemon is a pale yellow or greenish-yellow liquid, having the characteristic odor and taste of lemon.

Specific gravity: 0.851 to 0.855 at 25° C.

Refractive index: 1.4744 to 1.4755 at 20° C. (see Part II, Test No. 22).

The optical rotation varies from $+57°$ to $+64°$ in a 100 mm. tube at 25° C. (see Part II, Test No. 21).

The angle of rotation of the first 10 per cent. of the distillate, obtained as directed under *Oleum Aurantii*, is not more than 5 degrees less than that of the original Oil. The refractive index of this first 10 per cent. of distillate is not less than 0.002 nor more than 0.0027 lower than that of the original Oil.

Assay—Introduce about 15 mils of Oil of Lemon into a tared 300 mil flask and note the exact weight; add 10 mils of an alcoholic solution of phenylhydrazine (1 in 10) (not darker in color than pale yellow), and allow it to stand for one-half hour at room temperature. Then add a few drops of methyl orange T.S. and neutralize the liquid exactly by the cautious addition of half-normal hydrochloric acid V.S. If difficulty is experienced in detecting the end point of the reaction, continue the titration until the solution is distinctly acid, transfer it to a separatory funnel and draw off the alcoholic portion. Now wash the Oil with distilled water, adding the washings to the alcoholic solution, and titrate the latter with half-normal potassium hydroxide V.S. Carry out a blank test identical with the foregoing, except that the Oil of Lemon is omitted, and note the amount of half-normal hydrochloric acid V.S. consumed. Subtract the number of mils of half-normal potassium hydroxide V.S. from the number of mils of half-normal hydrochloric acid V.S. consumed in the original test and this result from the corresponding number of mils required in the blank test; each mil of this difference corresponds to 0.076 Gm. of aldehydes, calculated as citral. It shows, when calculated from the weight of Oil taken, not less than 4 per cent. of aldehydes from Oil of Lemon, calculated as citral.

Average dose—Metric, 0.2 mil—Apothecaries, 3 minims.

OLEUM LINI

Linseed Oil

Ol. Lini—Oil of Flaxseed Raw Linseed Oil

A fixed oil obtained from Linseed. Preserve it in well-stoppered containers. Linseed Oil which has been "boiled" must not be used nor dispensed.

Linseed Oil is a yellowish, oily liquid, having a peculiar odor and a bland taste. When exposed to the air, it gradually thickens, darkens in color, and acquires a strong odor and taste.

It is slightly soluble in alcohol, miscible with ether, chloroform, petroleum benzin, carbon disulphide, or oil of turpentine.

Specific gravity: 0.925 to 0.935 at 25° C.

It is not more than slightly acid to litmus paper which has previously been moistened with alcohol (*free acid*).

Linseed Oil when spread in a thin layer on a glass plate and allowed to stand in a warm place is gradually converted into a hard, transparent resin (*non-drying oils*).

To 10 mils of the Oil add 3 Gm. of potassium hydroxide, 10 mils of alcohol and 10 mils of distilled water, and heat the mixture on a water bath with frequent agitation, until a clear solution results. The addition of 100 mils of distilled water to this solution yields a clear liquid free from oily drops (*mineral or rosin oils*).

Warm 2 mils of the Oil with frequent agitation in a test tube with an equal volume of glacial acetic acid, and, after cooling, add to the mixture 1 drop of sulphuric acid. A greenish color is produced (a violet color under these circumstances indicates the presence of *rosin or rosin oils*).

Saponification value: not less than 187 nor more than 195 (see Part II, Test No. 9).

Iodine value: not less than 170 (see Part II, Test No. 8).

AVERAGE DOSE—Metric, 30 mils—Apothecaries, 1 fluidounce.

OLEUM MENTHÆ PIPERITÆ

Oil of Peppermint

Ol. Menth. Pip.—Peppermint Oil

A volatile oil distilled from the flowering plant of *Mentha piperita* Linné (Fam. *Labiatæ*), rectified by steam distillation, and yielding not less than 5 per cent. of esters, calculated as menthyl acetate $[C_{10}H_{19}C_2H_3O_2=198.18]$, and not less than 50 per cent. of total menthol $[C_{10}H_{19}OH=156.16]$, free and as esters. Preserve it in well-stoppered, amber-colored bottles, in a cool place, protected from light.

Oil of Peppermint is a colorless liquid, having a strong odor of peppermint, and a pungent taste, followed by a sensation of cold when air is drawn into the mouth.

It is soluble in 4 volumes of 70 per cent. alcohol, showing not more than slight opalescence and no separation of oil globules.

Specific gravity: 0.896 to 0.908 at 25° C.

The optical rotation varies between −23° and −33° in a 100 mm. tube at 25° C. (see Part II, Test No. 21).

Distil about 1 mil from 25 mils of the Oil and pour the distillate on 5 mils of mercuric chloride T.S.; a white film does not form at the zone of contact within one minute (*dimethyl sulphide* found in non-rectified oils).

Assay for esters—Introduce 10 mils of Oil of Peppermint into a tared flask and note the exact weight. Add 25 mils of half-normal alcoholic potassium hydroxide V.S., connect the flask with a reflux condenser, and boil the mixture during one hour. After cooling, titrate the residual alkali with half-normal sulphuric acid V.S., using phenolphthalein T.S. as indicator. Subtract the number of mils of half-normal sulphuric acid V.S. required from the 25 mils of half-normal alcoholic potassium hydroxide V.S. taken, multiply the difference by 9.909, and divide the product by the weight of the Oil of Peppermint taken to find the percentage of menthyl acetate.

Assay for total menthol—Introduce 10 mils of the Oil into a flask provided with a ground-glass tube-condenser (acetylization flask), add 10 mils of acetic anhydride and about 1 Gm. of powdered anhydrous sodium acetate, and boil the mixture gently during one hour. Allow it to cool, wash the acetylized oil with distilled water, and afterwards with sodium carbonate T.S., diluted with an equal volume of distilled water, until the mixture is slightly alkaline to phenolphthalein T.S., and then dry it with the aid of fused calcium chloride, and filter. Transfer 5 mils of the dry acetylized oil to a tared 100 mil flask, note the exact weight, add 50 mils of half-normal alcoholic potassium hydroxide V.S., connect the flask with a reflux condenser, and boil the mixture during one hour. After cooling, titrate the residual alkali with half-normal sulphuric acid V.S., using phenolphthalein T.S. as indicator, and calculate the percentage of menthol present by the following formula:

$$\text{Percentage of menthol} = \frac{A \times 7.808}{B - (A \times 0.021)}$$

In which A is the result obtained by subtracting the number of mils of half-normal sulphuric acid V.S. required in the above titration from the number of mils of half-normal alcoholic potassium hydroxide V.S. originally taken, and B is the weight of acetylized oil taken.

Preparations—Aqua Menthæ Piperitæ   Spiritus Menthæ Piperitæ.

AVERAGE DOSE—Metric, 0.2 mil—Apothecaries, 3 minims.

OLEUM MENTHÆ VIRIDIS

Oil of Spearmint

Ol. Menth. Vir.—Spearmint Oil

A volatile oil distilled from the flowering plant of *Mentha spicata* Linné (*Mentha viridis* Linné) (Fam. *Labiatæ*), and yielding not less than 43 per cent., by volume, of carvone [$C_{10}H_{14}O = 150.11$]. Preserve it in well-stoppered, amber-colored bottles, in a cool place, protected from light.

Oil of Spearmint is a colorless, yellow or greenish-yellow liquid, having the characteristic odor and taste of spearmint.

It is soluble in 1 volume of 80 per cent. alcohol, forming a clear solution; on further dilution, it usually becomes cloudy.

Specific gravity: 0.917 to 0.934 at 25° C.

The optical rotation varies between −38° and −55° in a 100 mm. tube at 25° C. (see Part II, Test No. 21).

Assay—Proceed as directed under *Oleum Cari*, using 10 mils of Oil of Spearmint.

Preparations—Aquæ Menthæ Viridis   Spiritus Menthæ Viridis.

AVERAGE DOSE—Metric, 0.2 mil—Apothecaries, 3 minims.

OLEUM MORRHUÆ

Cod Liver Oil

Ol. Morrh.—Oleum Jecoris Aselli

A fixed oil obtained from the fresh livers of *Gadus morrhua* Linné and of other species of *Gadus* (Fam. *Gadidæ*). Preserve it in a cool place, in well-closed containers, which have been thoroughly dried before filling.

Cod Liver Oil is a pale yellow, thin, oily liquid, having a peculiar, slightly fishy, but not rancid odor, and a fishy taste.

It is slightly soluble in alcohol; soluble in ether, chloroform, carbon disulphide, or ethyl acetate.

Specific gravity: 0.918 to 0.922 at 25° C.

A solution of 1 drop of the Oil in 1 mil of chloroform when shaken with 1 drop of sulphuric acid acquires a violet-red tint, gradually changing to reddish-brown.

Allow 2 or 3 drops of fuming nitric acid (specific gravity about 1.44) to flow alongside of 10 or 15 drops of the Oil contained in a watch glass; a reddish or purplish color is produced at the zone of contact. On stirring the mixture with a glass rod, this color becomes bright rose-red (distinction from *seal oil*, which shows no change in color, and from *other fish oils*, which become blue).

Cod Liver Oil is only slightly acid to litmus paper which has been previously moistened with alcohol (*free fatty acids*).

Saponification value: not less than 180 nor more than 190 (see Part II, Test No. 9).

Iodine value: not less than 140 nor more than 180 (see Part II, Test No. 8).

Preparation—Emulsum Olei Morrhuæ.

AVERAGE DOSE—Metric, 10 mils—Apothecaries, 2½ fluidrachms.

OLEUM MYRISTICÆ

Oil of Myristica

Ol. Myrist.—Myristica Oil Oil of Nutmeg

A volatile oil distilled from the kernel of the ripe seed of *Myristica fragrans* Houttuyn (Fam. *Myristicaceæ*). Preserve it in well-stoppered, amber-colored bottles, in a cool place, protected from light.

Oil of Myristica is a colorless or pale yellow liquid, having the characteristic odor and taste of nutmeg.

It is soluble in an equal volume of alcohol; also soluble in 3 volumes of 90 per cent. alcohol.

Specific gravity: 0.859 to 0.924 at 25° C.

The optical rotation varies from +12° to +30° in a 100 mm. tube at 25° C. (see Part II, Test No. 21).

Evaporate 3 Gm. of the Oil on a water bath; not more than 0.06 Gm. of residue remains.

AVERAGE DOSE—Metric, 0.2 mil—Apothecaries, 3 minims.

OLEUM OLIVÆ

Olive Oil

Ol. Oliv.

A fixed oil obtained from the ripe fruit of *Olea europæa* Linné (Fam. *Oleaceæ*). Preserve it in well-closed containers, in a cool place.

Olive Oil is a pale yellow or light greenish-yellow, oily liquid, having a slight, peculiar odor and taste, with a faintly acrid after-taste.

It is slightly soluble in alcohol, but miscible with ether, chloroform, or carbon disulphide.

Specific gravity: 0.910 to 0.915 at 25° C.

When cooled to from 10° to 8° C., the Oil becomes somewhat cloudy from the separation of crystalline particles, and at 0° C. it usually forms a whitish, granular mass.

Mix 5 mils of the Oil in a test tube with 5 mils of a mixture of equal volumes of amyl alcohol and carbon disulphide, which contains 1 per cent. of sulphur in solution, and immerse the test tube to one-third its depth in boiling, saturated aqueous salt solution; no reddish color develops in fifteen minutes (*cottonseed oil*).

Mix 2 mils of the Oil with 1 mil of hydrochloric acid containing 1 per cent. of sugar, shake the mixture for half a minute and allow it to stand for five minutes; on now adding 3 mils of distilled water to the mixture and again shaking it, the acid layer shows no pink color (*sesame oil*).

Saponification value: not less than 190 nor more than 195 (see Part II, Test No. 9).

Iodine value: not less than 79 nor more than 90 (see Part II, Test No. 8).

AVERAGE DOSE—Metric, 30 mils—Apothecaries, 1 fluidounce.

OLEUM PICIS LIQUIDÆ RECTIFICATUM

Rectified Oil of Tar

Ol. Pic Liq. Rect.—Oleum Picis Liquidæ, U.S.P. VIII Rectified Tar Oil

A rectified volatile oil distilled from Tar.

Rectified Oil of Tar is a thick liquid having a dark reddish-brown color, and a strong, empyreumatic odor and taste.

It is soluble in alcohol, the solution being acid to litmus.

Specific gravity: 0.960 to 0.990 at 25° C.

AVERAGE DOSE—Metric, 0.2 mil—Apothecaries, 3 minims.

OLEUM PIMENTÆ

Oil of Pimenta

Ol. Piment.—Pimento Oil Oil of Allspice

A volatile oil distilled from the fruit of *Pimenta officinalis* Lindley (Fam. *Myrtaceæ*), yielding not less than 65 per cent., by volume, of eugenol [$C_{10}H_{12}O_2 = 164.10$]. Preserve it in well-stoppered, amber-colored bottles, in a cool place, protected from light.

Oil of Pimenta is a colorless, yellow or reddish liquid, becoming darker with age and having the characteristic odor and taste of allspice.

It is soluble in an equal volume of 90 per cent. alcohol; also soluble in 2 volumes of 70 per cent. alcohol.

Specific gravity: 1.018 to 1.048 at 25° C.

The optical rotation varies from 0° to −4° in a 100 mm. tube at 25° C. (see Part II, Test No. 21).

Assay—Proceed as directed under *Oleum Caryophylli*, using 10 mils of Oil of Pimenta. The residual liquid measures not more than 3.5 mils, indicating the presence of not less than 65 per cent., by volume, of eugenol.

AVERAGE DOSE—Metric, 0.2 mil—Apothecaries, 3 minims.

OLEUM PINI PUMILIONIS

Oil of Dwarf Pine Needles

Ol. Pin. Pumil.—Dwarf Pine Oil

A volatile oil distilled from the fresh leaves of *Pinus montana* Miller (*Pinus Pumilio* Haenke) (Fam. *Pinaceæ*). Preserve it in well-stoppered, amber-colored bottles, in a cool place, protected from light.

Oil of Dwarf Pine Needles is a colorless or faintly yellowish oil having a pleasant, aromatic odor, and a bitter and pungent taste.

Specific gravity: 0.853 to 0.869 at 25° C.

No portion of the Oil distils below 170° C.

OLEUM RICINI

Castor Oil

Ol. Ricin.

A fixed oil obtained from the seeds of *Ricinus communis* Linné (Fam. *Euphorbiaceæ*). Preserve it in well-closed containers.

Castor Oil is a pale yellowish or almost colorless, transparent, viscid liquid, having a faint, mild odor, and a bland, afterwards slightly acrid and generally nauseating taste.

It is miscible with dehydrated alcohol or glacial acetic acid.

Specific gravity: 0.945 to 0.965 at 25° C.

Castor Oil is only partly soluble in petroleum benzin (distinction from *most other fixed oils*).

Castor Oil produces a clear liquid with an equal volume of alcohol (*foreign oils*).

Saponification value: not less than 179 nor more than 185 (see Part II, Test No. 9).

Iodine value: not less than 83 nor more than 88 (see Part II, Test No. 8).

AVERAGE DOSE—Metric, 15 mils—Apothecaries, 4 fluidrachms.

OLEUM ROSMARINI

Oil of Rosemary

Ol. Rosmar.—Rosemary Oil

A volatile oil distilled from the fresh flowering tops of *Rosmarinus officinalis* Linné (Fam. *Labiatæ*), yielding not less than 2.5 per cent. of ester, calculated as bornyl acetate [$C_{10}H_{17}C_2H_3O_2=196.16$], and not less than 10 per cent. of total borneol [$C_{10}H_{17}OH=154.14$]. Preserve it in well-stoppered, amber-colored bottles, in a cool place, protected from light.

Oil of Rosemary is a colorless or pale yellow liquid, having the characteristic odor of rosemary, and a camphoraceous taste.

It is soluble in 10 volumes of 80 per cent. alcohol.

Specific gravity: 0.894 to 0.912 at 25° C.

Assay for esters and total borneol—Proceed as directed for menthyl acetate and for menthol under *Oleum Menthæ Piperitæ*, using 10 mils of Oil of Rosemary for each assay. In place of the factor and formula for menthyl acetate and menthol, respectively, under *Oleum Menthæ Piperitæ* use the factor 9.808 in calculating the percentage of bornyl acetate and the following formula in calculating the percentage of borneol.

$$\text{Percentage of borneol}=\frac{A\times 7.707}{B-(A\times 0.021)}$$

In which A is the result obtained by subtracting the number of mils of half-normal sulphuric acid V.S. required in the titration from the number of mils of half-normal alcoholic potassium hydroxide V.S. originally taken, and B is the weight of acetylized oil taken.

Average dose—Metric, 0.2 mil—Apothecaries, 3 minims.

OLEUM SANTALI

Oil of Santal

Ol. Santal.—Santalwood Oil Oil of Sandalwood

A volatile oil distilled from the wood of *Santalum album* Linné (Fam. *Santalaceæ*), yielding not less than 90 per cent. of alcohols, calculated as santalol [$C_{15}H_{26}O=222.21$]. Preserve it in well-stoppered, amber-colored bottles, in a cool place, protected from light.

Oil of Santal is a pale yellow, somewhat thick liquid, having the characteristic odor and taste of sandalwood.

It is soluble in 5 volumes of 70 per cent. alcohol, forming a solution which is slightly acid to litmus.

Specific gravity: 0.965 to 0.980 at 25° C.

The optical rotation varies from −15° to −20° in a 100 mm. tube at 25° C. (see Part II, Test No. 21).

Assay—Proceed as directed for menthol under *Oleum Menthæ Piperitæ*, using 10 mils of Oil of Santal. Use the following formula in calculating the percentage of santalol in place of that given for menthol under *Oleum Menthæ Piperitæ*.

$$\text{Percentage of santalol}=\frac{A\times 11.11}{B-(A\times 0.021)}$$

In which A is the result obtained by subtracting the number of mils of half-normal sulphuric acid V.S. required in the titration from the number of mils of half-normal alcoholic potassium hydroxide V.S. originally taken, and *B* is the weight of acetylized oil taken.

AVERAGE DOSE—Metric, 0.5 mil—Apothecaries, 8 minims.

OLEUM SASSAFRAS

Oil of Sassafras

Ol. Sassaf.—Sassafras Oil

A volatile oil distilled from the root of *Sassafras variifolium* (Salisbury) O. Kuntze (Fam. *Lauraceæ*). Preserve it in well-stoppered, amber-colored bottles, in a cool place, protected from light.

Oil of Sassafras is a yellow or reddish-yellow liquid, having the characteristic odor and taste of sassafras.

It is soluble in 2 volumes of 90 per cent. alcohol, forming a solution neutral to litmus.

Specific gravity: 1.065 to 1.077 at 25° C.

The optical rotation varies from $+3°$ to $+4°$ in a 100 mm. tube at 25° C. (see Part II, Test No. 21).

AVERAGE DOSE—Metric, 0.2 mil—Apothecaries, 3 minims.

OLEUM SESAMI

Sesame Oil

Ol. Sesam.—Teel Oil Benne Oil

A fixed oil obtained from the seeds of one or more cultivated varieties of *Sesamum indicum* Linné (Fam. *Pedaliaceæ*). Preserve it in well-closed containers.

Sesame Oil is a pale yellow, oily liquid, almost odorless, and having a bland taste.

It is slightly soluble in alcohol, miscible with ether, chloroform, petroleum benzin, or carbon disulphide.

Specific gravity: 0.916 to 0.921 at 25° C.

Shake 1 mil of the Oil for half a minute with a solution of 0.1 Gm. of sugar in 10 mils of hydrochloric acid; the acid layer becomes bright red and changes to dark red on standing.

Blue litmus paper previously moistened with alcohol is not more than slightly reddened by 2 mils of the Oil (*free acid*).

Mix 5 mils of the Oil in a test tube with 5 mils of a mixture of equal volumes of amyl alcohol and a 1 per cent. solution of sulphur in carbon disulphide and immerse the test tube to one-third of its depth in a boiling saturated aqueous solution of sodium chloride; no reddish color develops in fifteen minutes (*cottonseed oil*).

Saponification value: not less than 188 nor more than 193 (see Part II, Test No. 9).

Iodine value: not less than 103 nor more than 112 (see Part II, Test No. 8).

OLEUM SINAPIS VOLATILE

Volatile Oil of Mustard

Ol. Sinap. Vol.—Mustard Oil

A volatile oil produced synthetically or obtained from the seed of *Brassica nigra* (Linné) Koch (Fam. *Cruciferæ*) (freed from fatty oil) by maceration with water and subsequent distillation. It yields not less than 92 per cent. of allyl isothiocyanate [$C_3H_5SCN = 99.12$]. The label must indicate whether the Oil has been made synthetically or obtained from black mustard. Preserve it in well-stoppered, amber-colored bottles, in a cool place, protected from light.

Volatile Oil of Mustard is a colorless or pale yellow, strongly refractive liquid, having a very pungent and irritating odor and an acrid taste.

Great caution should be exercised in smelling this Oil. It should not be tasted except when highly diluted.

Specific gravity: 1.013 to 1.020 at 25° C.

It is optically inactive.

The Oil distils completely between 148° and 154° C. and both the first and last portions of the distillate have nearly the same specific gravity as the original Oil (*alcohol, chloroform, petroleum, or fatty oils*).

The addition of a drop of ferric chloride T.S. to the Oil, diluted with several volumes of alcohol, does not produce a blue coloration (*phenols*).

Assay—Dilute about 4 mils of Volatile Oil of Mustard, accurately weighed, with sufficient alcohol to make exactly 100 mils. Transfer 5 mils of this solution to a 100 mil measuring flask, and add 50 mils of tenth-normal silver nitrate V.S. and 5 mils of ammonia water. Stopper the flask, connect it with a reflux condenser and heat it on a water bath during one hour. Allow it to cool, dilute the contents of the flask with distilled water to the 100 mil mark, mix well and filter. Add 4 mils of nitric acid and 2 mils of ferric ammonium sulphate T.S. to 50 mils of the filtrate and titrate the excess of the silver nitrate with tenth-normal potassium sulphocyanate V.S.

When calculated from the weight of Oil taken for the assay it shows not less than 92 per cent. of allyl isothiocyanate. Each mil of tenth-normal silver nitrate V.S. consumed corresponds to 0.004956 Gm. of allyl isothiocyanate.

AVERAGE DOSE—Metric, 0.008 mil—Apothecaries, ⅛ minim.

OLEUM TEREBINTHINÆ

Oil of Turpentine

Ol. Tereb.—Turpentine Oil "Spirits of Turpentine"

The volatile oil distilled with water from the concrete oleoresin obtained from *Pinus palustris* Miller or from other species of *Pinus* (Fam. *Pinaceæ*). Preserve it in well-closed containers.

Oil of Turpentine is a colorless liquid having a characteristic odor and taste, both of which become stronger and less pleasant on aging or exposure to the air.

Soluble in 5 volumes of alcohol.

Specific gravity: 0.860 to 0.870 at 25° C.

Optical rotation variable.

Distil 200 mils of the Oil, at the rate of two drops per second, from a 300 mil globe flask, having the side tube 8 cm. above the bulb. Ninety per cent. of the Oil distils between 154° and 170° C., the temperature being read with the mercury column of the thermometer immersed in the vapor.

Five mils of the Oil, shaken with an equal volume of potassium hydroxide T.S., does not become darker than a light straw yellow after standing twenty-four hours.

Five mils of the Oil, evaporated in a small dish on a water bath, leaves not more than 0.1 Gm. of residue.

Three drops of the Oil, placed on unsized, white paper, and exposed to the air, evaporates entirely without leaving a permanent stain (*fixed oils*).

Five mils of the Oil shaken vigorously with an equal volume of hydrochloric acid in a test tube, and allowed to stand for a few minutes, does not produce a brownish or greenish color.

Into a flask of from 35 to 50 mils capacity, having a long graduated neck (cassia flask), and containing 25 mils of fuming sulphuric acid, introduce very slowly, *drop by drop*, with constant shaking 5 mils of Oil of Turpentine, keeping the temperature just below 65° C. by immersion in cold water during the addition of the oil, and for five minutes thereafter, in the meantime frequently agitating the mixture cautiously but vigorously. Then cool, and add sulphuric acid until the flask is filled to the upper graduation on the neck. The clear, reddish, viscous layer, which forms after the dark mass has settled for two hours, does not exceed 1 per cent. of the volume of Oil taken. A larger layer of colorless liquid with a refractive index of less than 1.5 at 20° C. shows the presence of mineral oil.

Caution—The addition of the Oil of Turpentine to the fuming sulphuric acid, drop by drop, is necessary because of the violence of the reaction.

Preparations—Ceratum Cantharidis Linimentum Terebinthinæ Oleum Terebinthinæ Rectificatum.

OLEUM TEREBINTHINÆ RECTIFICATUM

Rectified Oil of Turpentine

Ol. Tereb. Rect.—Rectified Turpentine Oil

Oil of Turpentine, *a convenient quantity.*

Solution of Sodium Hydroxide, *a sufficient quantity.*

Shake the oil of turpentine thoroughly with an equal volume of solution of sodium hydroxide and introduce the mixture into a still connected with a well-cooled condenser. Recover about three-fourths of the oil by distillation, separate the clear oil from the water, dry it by shaking with anhydrous calcium chloride, filter and preserve the product in well-stoppered, amber-colored bottles, in a cool place.

Rectified Oil of Turpentine is to be dispensed when oil of turpentine is required for internal use.

Rectified Oil of Turpentine is a colorless liquid which conforms to the properties and tests under *Oleum Terebinthinæ*, specific gravity excepted.

Specific gravity: 0.856 to 0.865 at 25° C.

Evaporate 5 mils of the Oil rapidly in a tared dish on a water bath; not more than 0.015 Gm. of residue remains.

Preparation—Emulsum Olei Terebinthinæ.

Average dose—Metric, 0.3 mil—Apothecaries, 5 minims.

OLEUM THEOBROMATIS

Oil of Theobroma

Ol. Theobrom.—Butter of Cacao Cacao Butter

A concrete fixed oil obtained from the roasted seeds of *Theobroma Cacao* Linné (Fam. *Sterculiaceæ*).

Oil of Theobroma is a yellowish-white solid, having a faint, agreeable odor, and a bland, chocolate-like taste.

It is usually brittle at temperatures below 25° C.

It is slightly soluble in alcohol, soluble in boiling dehydrated alcohol, and freely soluble in ether, chloroform, or benzene.

Specific gravity: about 0.973 at 25° C.

It melts between 30° and 35° C.

Dissolve 1 Gm. of Oil of Theobroma in 3 mils of ether in a test tube at a temperature of 17° C., and immerse the tube into water having the temperature of melting ice. The liquid does not become turbid nor deposit white flakes in less than three minutes; and if the mixture after congealing is again brought to 15° C., it gradually forms a perfectly clear liquid (*wax, stearin, or tallow*).

Saponification value: not less than 188 nor more than 195 (see Part II, Test No. 9).

Iodine value: not less than 33 nor more than 38 (see Part II, Test No. 8).

OLEUM THYMI

Oil of Thyme

Ol. Thymi—Thyme Oil

A volatile oil distilled from the flowering plant of *Thymus vulgaris* Linné (Fam. *Labiatæ*), and containing not less than 20 per cent., by volume, of phenols. Preserve it in well-stoppered, amber-colored bottles, in a cool place, protected from light.

Oil of Thyme is a colorless or red liquid, having a characteristic odor and taste.

It is soluble in 2 volumes of 80 per cent. alcohol.

Specific gravity: 0.894 to 0.930 at 25° C.

It is slightly lævorotatory.

Shake 1 mil of the Oil with 10 mils of hot distilled water, and, after cooling, pass the aqueous layer through a wetted filter; the filtrate does not assume a blue or violet color upon the addition of a drop of ferric chloride T.S.

Assay—Introduce 75 mils of sodium hydroxide T.S. into a flask with a long graduated neck (cassia flask), add 10 mils of the Oil to be assayed, stopper the flask tightly, shake the mixture thoroughly, and set it aside for from twelve to twenty-four hours. Then add sufficient sodium hydroxide T.S. to raise the lower limit of the oily layer within the graduated portion of the neck of the flask, and, after the alkaline solution has become clear, adjust it to the temperature at which it was measured, and note the volume of the residual liquid. This measures not more than 8 mils, indicating the presence of not less than 20 per cent., by volume, of phenols.

Average dose—Metric, 0.2 mil—Apothecaries, 3 minims.

OLEUM TIGLII

Croton Oil

Ol. Tiglii

A fixed oil expressed from the seeds of *Croton Tiglium* Linné (Fam. *Euphorbiaceæ*). Preserve it in small, well-stoppered bottles, protected from light.

Croton Oil is a pale yellow or brownish-yellow, somewhat viscid and slightly fluorescent liquid, having a slight, characteristic odor. *Great caution is necessary in tasting it*, and it must be handled carefully as it causes a pustular eruption, when applied to the skin.

It is slightly soluble in alcohol, the solubility increasing with age; freely soluble in ether, chloroform, or in fixed or volatile oils.

It is acid to litmus paper previously moistened with alcohol.

Specific gravity: 0.935 to 0.950 at 25° C.

When gently heated with twice its volume of dehydrated alcohol, it forms a clear solution from which the Croton Oil separates, either partially or completely on cooling.

Add 1 mil each of fuming nitric acid and of distilled water to 2 mils of the Oil, and shake the mixture vigorously for a few minutes; it does not solidify either completely or partially after standing for twenty-four hours.

Saponification value: not less than 200 nor more than 215 (see Part II, Test No. 9).

Iodine value: not less than 104 nor more than 110 (see Part II, Test No. 8).

AVERAGE DOSE—Metric, 0.05 mil—Apothecaries, 1 minim.

OPII PULVIS

Powdered Opium

Opii Pulv.—Opii pulvis, P. I.

Opium dried at a temperature not exceeding 70° C., reduced to a very fine powder, and yielding not less than 10 per cent. nor more than 10.5 per cent. of anhydrous morphine. Powdered Opium of a higher morphine percentage may be brought within the required limits by admixture with powdered opium of a lower percentage, or with some inert diluent. Preserve it in well-closed containers.

Powdered Opium is light brown; consisting chiefly of yellowish-brown to brownish-red, more or less irregular and granular fragments, varying from 0.015 to 0.15 mm. in diameter; a few fragments of strongly lignified, thick-walled, 4- to 5-sided or narrowly elongated, epidermal cells of the poppy capsule; and very few fragments of tissues of poppy leaves, poppy capsules, and rumex fruits.

Assay—Proceed as directed under *Opium*.

Preparations—Opium Deodoratum Pulvis Ipecacuanhæ et Opii Tinctura Opii Camphorata.

AVERAGE DOSE—Metric, 0.06 Gm.—Apothecaries, 1 grain.

OPIUM

Opium

The air-dried, milky exudation obtained by incising the unripe capsules of *Papaver somniferum* Linné and its variety *album* De Candolle (Fam. *Papaveraceæ*), and yielding, in its normal, moist condition, not less than 9.5 per cent. of anhydrous morphine.

In more or less rounded, mostly somewhat flattened masses of variable size, but usually about 8 to 15 cm. in diameter; externally grayish-brown, covered with fragments of poppy leaves and at times with some fruits of a species of rumex adhering from the packing; more or less plastic when fresh, becoming hard and brittle on keeping; internally dark brown, interspersed with lighter areas, somewhat lustrous; odor characteristic, narcotic; taste bitter, characteristic.

For a description of the powder see *Opii Pulvis*.

Assay—Introduce 8 Gm. of Opium, which if fresh should be in very small pieces, and if dry in fine powder, into an Erlenmeyer flask having a capacity of about 250 mils, add 80 mils of distilled water, stopper the flask, and agitate it every ten minutes (or continuously in a mechanical shaker) during three hours. Then pour the contents as evenly as possible upon a wetted filter having a diameter of not over 12 cm., and, when the liquid has drained off, wash the residue with distilled water, carefully dropped upon the edges of the filter and its contents, until 120 mils of filtrate have been obtained. Carefully transfer the moist Opium to a mortar by means of a spatula, and rub to a smooth paste, then rinse into the original flask with 50 mils of distilled water, agitate it thoroughly and return the whole to the filter. When the liquid has drained off, wash the residue with 75 mils of distilled water. Evaporate the mixed filtrates and washings on a water bath to about 40 Gm. Transfer the extract to a 50 mil graduated flask and wash the evaporating dish with sufficient distilled water to make the entire volume measure exactly 50 mils when cooled to room temperature. Place in a small mortar 4 Gm. of freshly slaked lime (see Reagents, Part II), add about 10 mils of the opium extract and rub to a smooth paste, then add the remainder of the extract and rinse the flask with exactly 10 mils of distilled water, adding the rinsings to the mortar, and stir frequently during fifteen minutes, avoiding unnecessary loss by evaporation. Filter through a dry filter, about 10 cm. in diameter, and transfer exactly 30 mils of the filtrate, representing *four grammes* of Opium, to an Erlenmeyer flask of suitable capacity. To this add 2 mils of alcohol and 15 mils of ether, and, after shaking the mixture, add 1 Gm. of ammonium chloride, stopper the flask and shake it frequently during half an hour, then set it aside in a cool place for twelve hours or over night. Remove the stopper and brush any adhering crystals back into the flask. Decant the ethereal layer into a small funnel, the neck of which has been previously closed with a pledget of purified cotton. Rinse the flask and contents with 15 mils of ether, and, when the ether has passed through, wash the funnel and cotton with a small quantity of ether, and then pour the aqueous liquid into the funnel without trying to remove the crystals. Wash the crystals in the flask and the contents of the funnel with distilled water, previously saturated with morphine, until the washings are colorless. Then add a few drops of distilled water to replace the morphinated water. Incline the edge of the funnel over the mouth of the flask and by means of a glass rod carefully transfer the cotton with adhering crystals to the flask. Insert the funnel into the neck of the flask and wash the funnel with 20 mils of tenth-normal sulphuric acid V.S., followed by 10 mils of distilled water, applied drop by drop around the edge of the funnel. Remove the funnel, replace the cork, warm gently, and agitate until the crystals are dissolved. Rinse the cork with distilled water and titrate the excess of acid with fiftieth-normal potassium hydroxide V.S., cochineal T.S.

being used as indicator. Each mil of tenth-normal sulphuric acid V.S. consumed corresponds to 0.028516 Gm. of anhydrous morphine.

Preparations—Extractum Opii Mistura Glycyrrhizæ Composita (from Camphorated Tincture of Opium) Opii Pulvis Opium Deodoratum Opium Granulatum Pulvis Ipecacuanhæ et Opii Tinctura Opii Tinctura Opii Camphorata Tinctura Opii Deodorati.

AVERAGE DOSE—Metric, 0.06 Gm.—Apothecaries, 1 grain.

OPIUM DEODORATUM

Deodorized Opium

Opium Deod.

Deodorized Opium yields not less than 10 per cent. nor more than 10.5 per cent. of anhydrous morphine. Deodorized Opium of a higher morphine percentage may be brought within the required limits by admixture with deodorized opium of a lower percentage or with some inert diluent. Preserve it in well-closed containers.

POWDERED OPIUM, *five hundred grammes* .... 500 Gm.
PURIFIED PETROLEUM BENZIN, *a sufficient quantity.*

Macerate the powdered opium for twenty-four hours in a wide-mouthed, well-closed bottle with sufficient purified petroleum benzin to cover it completely, shaking the mixture occasionally. Then decant the clear benzin layer as closely as possible and repeat the maceration for twenty-four hours with another portion of purified petroleum benzin. Again decant the clear benzin layer and transfer the remaining contents of the bottle to a plain filter. Closely cover the funnel, allow the mixture to drain and then slowly percolate the residue with purified petroleum benzin until the latter passes through without color. Remove the filter containing the Opium from the funnel, expose the powder to the open air, so that it may dry thoroughly, and add sufficient sugar of milk to restore the original weight. Care should be used to guard against the danger due to the inflammability of the benzin. Granulated opium may also be deodorized in the manner directed above.

Assay—Proceed as directed under *Opium.*

AVERAGE DOSE—Metric, 0.06 Gm.—Apothecaries, 1 grain.

OPIUM GRANULATUM

Granulated Opium

Opium Gran.

Opium dried at a temperature not exceeding 70° C., reduced to a coarse (No. 8 to No. 20) powder and yielding not less than 10 per cent. nor more than 10.5 per cent. of anhydrous morphine. Granulated Opium of a higher morphine percentage may be brought within the required limits of strength by admixture with granulated opium of a lower percentage, or with some inert diluent. Preserve it in well-closed containers.

Assay—Proceed as directed under *Opium*.

Preparations—Tinctura Opii   Tinctura Opii Deodorati.

AVERAGE DOSE—Metric, 0.06 Gm.—Apothecaries, 1 grain.

OXYGENIUM

Oxygen

Oxygen.

It contains not less than 95 per cent. by volume of O (16). For convenience it is usually compressed in metal cylinders.

Oxygen is a colorless, odorless, and tasteless gas. It supports combustion more readily than air; a glowing splinter of wood held in the gas bursts into flame.

One volume of Oxygen dissolves in about 34 volumes of water and in about 3.6 volumes of alcohol at 25° C.

Pass 2000 mils of Oxygen, measured under normal atmospheric pressure at about 25° C., at a rate not exceeding 4000 mils per hour, through 100 mils of barium hydroxide T.S.; not more than an opalescent turbidity is produced (*carbon dioxide*).

Pass 2000 mils of Oxygen, under the conditions described above, through a mixture of distilled water and 1 mil of silver nitrate T.S.; no opalescence is produced (*halogens*).

Pass 2000 mils of Oxygen through 100 mils of distilled water, colored with a few drops of litmus T.S., under the conditions described above; the color of the liquid is not changed (*acids or bases*).

Assay—Mix about 50 mils of Oxygen, accurately measured in a calibrated tube, with 10 mils of alkaline pyrogallol T.S.; not less than 95 per cent. by volume is absorbed, corresponding to not less than 95 per cent. by volume of O.

PANCREATINUM

Pancreatin

Pancreat.

It contains enzymes, consisting principally of amylopsin, trypsin, and steapsin, found in the pancreas of warm-blooded animals, and obtained from the fresh pancreas of the hog (*Sus scrofa* var. *domesticus* Gray) (Fam. *Suidæ*), or of the ox (*Bos taurus* Linné) (Fam. *Bovidæ*). It converts not less than 25 times its own weight of starch into soluble carbohydrates when assayed as directed on page 309. Pancreatin of a higher digestive power may be brought to this standard by admixture with sugar of milk. Preserve it in well-closed containers.

Pancreatin is a cream-colored, amorphous powder, having a faint, characteristic, but not offensive odor.

It is slowly and incompletely soluble in water; insoluble in alcohol.

Pancreatin changes proteins into proteoses and derived substances, and converts starch into dextrins and sugars. Its peculiar activities are best exhibited in neutral or faintly alkaline media; more than traces of mineral acids or large amounts of alkali hydroxides render it inert. An excess of alkali carbonates also inhibits its action.

Introduce 2 Gm. of Pancreatin into a flask of about 50 mils capacity, add 20 mils of ether, stopper and set it aside for several hours, shaking by rotating at frequent intervals. Decant the supernatant ether, by means of a guiding rod, into a plain filter of about 7 cm. diameter, previously moistened with ether, and collect the filtrate in a tared beaker. To the residue remaining in the flask add a further portion of 10 mils of ether, proceeding as directed before, then a third portion of 10 mils of ether and transfer the ether and the remainder of the pancreatin to the filter. Allow the filter and contents to drain, then allow the ether to evaporate spontaneously and dry the beaker and residue to constant weight at 100° C. The residue weighs not more than 0.06 Gm. (*fat*).

Add 0.28 Gm. of Pancreatin and 1.5 Gm. of sodium bicarbonate to 100 mils of tepid distilled water contained in a flask, then add 400 mils of fresh milk which has previously been heated to 40° C., and maintain the temperature of the mixture at this point for thirty minutes. At the end of this time the milk is so completely peptonized that on diluting 3 mils with 9 mils of distilled water and then mixing with 3 mils of acetic acid no coagulation occurs.

Assay—Shake 10 Gm. or more of powdered potato starch (see Part II) with about 10 times its weight of cold distilled water, and, after draining the mixture on a filter, wash it with the same quantity of distilled water. Place the washed starch at once in an air bath and maintain a temperature of about 50° C., until the starch is sensibly dry. Reduce it to a fine powder and place it in a well-stoppered bottle. Determine the percentage of water still remaining in the starch by drying about 0.5 Gm. of it in an air bath, gradually raising the temperature to 120° C. and maintaining it at that temperature for four hours. Of the washed and partially dried starch, mix a quantity equivalent to 7.5 Gm. of dry starch in a 400 mil beaker with 10 mils of cold distilled water, add 190 mils of boiling distilled water and boil the mixture gently (for approximately five minutes) with constant stirring until a translucent uniform paste is obtained. Replace the water lost by evaporation and cool the paste to 40° C. in a water bath previously adjusted to this temperature and add a solution of 0.3 Gm. of Pancreatin in 10 mils of distilled water, just previously made at 40° C. Mix well and maintain the same temperature for exactly five minutes, when a thin, nearly clear liquid is produced. At once add 0.1 mil of this liquid to a previously made mixture of 0.2 mil of tenth-normal iodine V.S. and 60 mils of distilled water; no blue, red, or violet color is produced.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

PARAFFINUM

Paraffin

Paraff.

A purified mixture of solid hydrocarbons, usually obtained from petroleum.

Paraffin is a colorless, or white, more or less translucent mass, crystalline when separating from solution, without odor or taste, and slightly greasy to the touch.

It is insoluble in water or alcohol; slightly soluble in dehydrated alcohol, freely soluble in ether, petroleum benzin, benzene, carbon disulphide, volatile oils, or in most warm fixed oils.

Specific gravity: about 0.900 at 25° C.

It melts between 50° and 57° C.

When strongly heated, it ignites, burns with a luminous flame, and deposits carbon.

Heat about 0.5 Gm. of Paraffin in a dry test tube with an equal weight of sulphur; the mixture becomes black from separated carbon, and hydrogen sulphide gas is evolved.

Paraffin is not acted upon or colored by concentrated sulphuric acid or nitric acid in the cold.

Shake melted Paraffin with an equal volume of hot alcohol; the separated alcohol does not redden moistened blue litmus paper (*acids*).

PARAFORMALDEHYDUM

Paraformaldehyde

Paraform.—Paraform Trioxymethylene

It contains not less than 95 per cent. of $(HCHO)_3$ (90.05), a polymeric form of formaldehyde. Preserve it in well-closed containers in a cool place, protected from light.

Paraformaldehyde occurs in white, friable masses, or as a powder, having a slight odor of formaldehyde. On heating it is partly converted into formaldehyde and partly sublimed unchanged.

It is slowly soluble in cold water, more readily soluble in hot water with the formation of formaldehyde; insoluble in alcohol or ether; soluble in fixed alkali solutions.

A mixture of about 0.01 Gm. each of Paraformaldehyde and morphine sulphate and 10 drops of sulphuric acid assumes a violet-red color, changing to blue.

Incinerate about 2 Gm. of Paraformaldehyde; not more than 0.1 per cent. of ash remains.

Shake about 0.5 Gm. of Paraformaldehyde, finely powdered, with 10 mils of distilled water; the latter remains neutral to litmus.

Assay—Mix about 1 Gm. of Paraformaldehyde, finely powdered and accurately weighed, with 50 mils of normal potassium hydroxide V.S. in a 250 mil flask, and add immediately, but slowly, through a small funnel, 50 mils of solution of hydrogen dioxide which has been previously rendered neutral to litmus with sodium hydroxide. When the reaction has ceased and the foam subsided, rinse the funnel and the sides of the flask with distilled water, allow the liquid to stand for half an hour and then determine the excess of alkali with normal sulphuric acid V.S., using litmus T.S. as indicator. It shows not less than 95 per cent. of $(HCHO)_3$.

Each mil of normal potassium hydroxide V.S. corresponds to 0.03002 Gm. of $(HCHO)_3$. Each gramme of Paraformaldehyde corresponds to not less than 31.6 mils of normal potassium hydroxide V.S.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

PARALDEHYDUM

Paraldehyde

Paraldehyd.

A polymer $[(CH_3CHO)_3 = 132.10]$ of acetaldehyde. Preserve it in well-closed containers, in a cool place, protected from light.

Paraldehyde is a colorless, transparent liquid, having a strong, characteristic, but not unpleasant or pungent odor, producing first a burning and then a cooling sensation in the mouth.

One mil of Paraldehyde dissolves in 8 mils of water at 25° C.; also in 17 mils of boiling water; miscible with alcohol, chloroform, ether, or volatile oils.

It is neutral or only slightly acid to moistened litmus paper.

Specific gravity: about 0.990 at 25° C.

It boils between 120° and 125° C.

Congealing point: not below 6° C.

When heated with a small portion of sulphuric acid, Paraldehyde is converted into acetaldehyde, recognizable by its odor.

Heat 5 mils of Paraldehyde on a water bath; no disagreeable odor is noticeable as the last portions evaporate (*impurities derived from fusel oil*) and not more than 0.0025 Gm. of residue remains.

One mil of Paraldehyde forms a clear solution free from oily drops with 10 mils of distilled water (*amyl alcohol*), and 5 mil portions of this solution, tested separately, when acidulated with nitric acid, yield no turbidity on the addition of a few drops of barium chloride T.S. (*sulphuric acid*) nor an opalescence with a few drops of silver nitrate T.S. (*hydrochloric acid*).

A mixture of 8 mils of Paraldehyde and 8 mils of alcohol with 1 drop of phenolphthalein T.S. acquires a pink color upon the addition of 0.5 mil of normal potassium hydroxide V.S. (*free acid*).

Shake 5 mils of Paraldehyde with 5 mils of potassium hydroxide T.S.; the aqueous layer is not colored yellow or brown within one hour (*acetaldehyde*).

AVERAGE DOSE—Metric, 2 mils—Apothecaries, 30 minims.

PELLETIERINÆ TANNAS

Pelletierine Tannate

Pellet. Tann.

A mixture in varying proportions of the tannates of four alkaloids (punicine, iso-punicine, methyl-punicine, and pseudo-punicine), obtained from pomegranate. Preserve it in small, well-closed containers, protected from light.

Pelletierine Tannate is a light yellow, odorless, amorphous powder, having an astringent taste, and a weak acid reaction.

One Gm. of Pelletierine Tannate dissolves in 240 mils of water, 16 mils of alcohol, and in 420 mils of ether at 25° C.; dissolved by warm dilute acids; insoluble in chloroform.

Ferric chloride T.S. colors aqueous solutions of the salt blue-black.

No weighable ash remains on incinerating 0.2 Gm. of Pelletierine Tannate.

Platinic chloride T.S. produces no precipitate in a cold solution of about 0.1 Gm. of Pelletierine Tannate in a mixture of 4 mils of distilled water and 1 mil of diluted hydrochloric acid (*foreign alkaloids*).

Dissolve about 0.5 Gm. of Pelletierine Tannate, accurately weighed, in 5 mils of potassium hydroxide T.S. and shake the solution in a separator with 10 mils of chloroform and then with two or more successive portions of 5 mils each of chloroform. Acidulate the combined chloroform solutions with 0.1 mil of hydrochloric acid, evaporate it to apparent dryness, dissolve the residue in 5 mils of alcohol, again evaporate, and dry for one hour at 60° C. The weight of residue so obtained corresponds to not less than 20 per cent. of the weight taken.

The residue obtained in the preceding test responds to the following tests for identity and purity:

Stir about 0.001 Gm. of the residue on a white porcelain surface with 2 drops of sulphuric acid containing 0.005 Gm. of selenous acid in each mil, and warm the mixture; a light bluish-green color is produced which gradually changes to dark green.

Stir about 0.001 Gm. of the residue on a white porcelain surface with 2 drops of sulphuric acid or nitric acid; no color other than a light yellow is produced.

Average dose—Metric, 0.25 Gm.—Apothecaries, 4 grains.

PEPO

Pepo

Pumpkin Seed

The dried ripe seeds of cultivated varieties of *Cucurbita Pepo* Linné (Fam. *Cucurbitaceæ*), without the presence or admixture of more than 5 per cent. of other substances.

Broadly elliptical or ovate, from 15 to 23 mm. in length and from 2 to 3 mm. in thickness; externally yellowish-white, very smooth, occasionally with thin, transparent fragments of adhering pulp and with a shallow groove parallel to and within 1 mm. of the margin; fracture short, seed-coat consisting of a white coriaceous outer layer and a membranous inner layer occasionally of a dark green color; embryo whitish, straight, with a small conical hypocotyl and two plano-convex cotyledons; slightly odorous when contused; taste bland and oily.

Under the microscope, sections of Pepo show an outer epidermal layer consisting of palisade-like cells, the radial walls attaining a length of 1 mm., the outer walls being usually torn off so that it appears as though the seeds were covered with very long hairs; a sub-epidermal layer consisting of from 5 to 12 rows of cells with slightly thickened, lignified and porous walls; a layer of strongly lignified stone cells, elliptical in outline and about 0.075 mm. in length; a single layer of small cells resembling those of the sub-epidermal layer; several rows of parenchyma cells with characteristic reticulate markings and separated from each other by large intercellular spaces; several layers of parenchyma cells, the inner layer being more or less collapsed and bounded on the inside by a single epidermal layer, the cells having rather thick walls; the perisperm cells are usually more or less collapsed and the endosperm consists of a single layer of cells filled with small aleurone grains; the cotyledons consist of thin-walled, isodiametric, elongated or palisade-like cells containing a fixed oil and numerous small aleurone grains.

Average dose—Metric, 30 Gm.—Apothecaries, 1 ounce.

PEPSINUM

Pepsin

Pepsin.

A mixture containing a proteolytic ferment or enzyme, obtained from the glandular layer of the fresh stomach of the hog (*Sus scrofa*, var. *domesticus* Gray) (Fam. *Suidæ*). It digests not less than 3000 times its own weight of freshly coagulated and disintegrated egg albumen. Pepsin of a higher digestive power may be brought to this standard by admixture with pepsin of a lower digestive strength or with sugar of milk. Preserve it in well-closed containers.

Pepsin occurs in lustrous, white, pale yellow or yellowish, transparent or translucent scales, grains or spongy masses, or as a fine, white or cream-colored, amorphous powder, free from any offensive odor, and having a slightly acid or saline taste. It is not more than slightly hygroscopic.

One Gm. of Pepsin dissolves in about 50 parts of water, the solution being more or less opalescent; nearly insoluble in alcohol, chloroform or ether.

An aqueous solution of Pepsin (1 in 50) is acid to litmus.

When in solution, Pepsin is incompatible with alkalies, alkali earths, or alkali carbonates. The presence of hydrochloric acid of greater strength than 0.5 per cent. in Pepsin solutions inhibits its proteolytic activity. A precipitate is produced in its solution by the salts of many heavy metals, and by tannic acid or gallic acid.

A saturated solution of Pepsin in acidulated water when heated to 100° C. becomes milky, or yields a light, flocculent precipitate, and loses all proteolytic power. In a dry state it is not injured if subjected to the above temperature. The activity of Pepsin in solution is destroyed by temperatures exceeding 70° C.

Assay—Mix 25 mils of normal hydrochloric acid V.S. with 275 mils of distilled water and dissolve 0.1 Gm. of Pepsin in 150 mils of this liquid. Immerse a hen's egg, which is not less than five nor more than twelve days old and has been kept in a cool place, in boiling water during fifteen minutes. As soon as the egg has sufficiently cooled to handle it, remove the pellicle and all of the yolk; at once rub the albumen through a clean, dry, hair or brass, No. 40 sieve, reject the first portion that passes through the sieve, and place 10 Gm. of the succeeding portion in a wide-mouthed bottle of 100 mils capacity. Immediately add 2 mils of the acid liquid and, with the aid of a rubber-tipped glass rod, moisten the albumen uniformly. Again add 2 mils of the acid liquid, repeat the manipulation with the glass rod, and with gradually increasing portions of the acid liquid, until the total amount added measures 20 mils. Thoroughly separate the particles of albumen from each other, rinse the rod with 15 mils more of the acid liquid, and, after warming the mixture to 52° C., add exactly 5 mils of the solution of Pepsin. At once cork the bottle securely, invert it three times, and place it in a water bath that has previously been regulated to maintain a temperature of 52° C. Keep it at this temperature for two and one-half hours, agitating the contents every ten minutes by inverting the bottle once. Then remove it from the water bath, pour the contents into a conical measure having a diameter not exceeding 1 cm. at the bottom, and transfer the undigested egg albumen which adheres to the sides of the bottle to the measure with the aid of small portions (about 15 mils at a time) of distilled water, until the total amount used measures 50 mils. Stir the mixture well and let it stand for half an hour; the deposit of undissolved albumen does not then measure more than 1 mil.

The relative proteolytic power of Pepsin, stronger or weaker than that just described, may be determined by ascertaining through repeated trials the quantity of the Pepsin solution, made as directed in the assay, required to digest, under the prescribed conditions, 10 Gm. of boiled and disintegrated egg albumen. Divide 15,000 by this quantity expressed in mils to ascertain how many parts of egg albumen one part of Pepsin will digest.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

PETROLATUM

Petrolatum

Petrolat.—Petrolatum Ointment Petroleum Jelly

A purified mixture of semi-solid hydrocarbons, obtained from petroleum.

Petrolatum is an unctuous mass, varying in color from yellowish to light amber, having not more than a slight fluorescence, even after being melted;

it is transparent in thin layers; completely amorphous; free or nearly free from odor or taste.

Petrolatum is insoluble in water; almost insoluble in cold or hot alcohol, or in cold dehydrated alcohol; freely soluble in ether, chloroform, carbon disulphide, oil of turpentine, petroleum benzin, benzene, or in most fixed or volatile oils.

Specific gravity: 0.820 to 0.865 at 60° C.

It melts between 38° and 54° C.

Heat about 2 Gm. of Petrolatum in an open porcelain or platinum dish, over a Bunsen flame: it volatilizes without emitting an acrid odor, and on incineration not more than 0.05 per cent. of ash remains.

Shake melted Petrolatum with an equal volume of hot distilled water; the latter remains neutral to litmus (*acids or alkalies*).

Digest 10 Gm. of Petrolatum at 100° C. for half an hour with 10 Gm. of sodium hydroxide and 50 mils of distilled water, then separate the aqueous layer and supersaturate it with sulphuric acid; no oily or solid substance separates (*fixed oils, fats*, or *rosin*).

PETROLATUM ALBUM

White Petrolatum

Petrolat. Alb.—White Petroleum Jelly

Petrolatum wholly or nearly decolorized.

White Petrolatum is a white or faintly yellowish unctuous mass, transparent in thin layers even after cooling to 0° C.; completely amorphous.

In other respects White Petrolatum has the characteristics of and responds to the tests for identity and purity under *Petrolatum*.

PETROLATUM LIQUIDUM

Liquid Petrolatum

Petrolat. Liq.—Liquid Paraffin Mineral Oil

A mixture of liquid hydrocarbons obtained from petroleum. Preserve it in well-closed containers, protected from light.

Heavy Liquid Petrolatum—

Heavy Liquid Petrolatum has a viscosity of *not less* than 3.1 when determined by the test given below.

Light Liquid Petrolatum—

Light Liquid Petrolatum has a viscosity of *not more* than 3 when determined by the test given below and vaporizes freely.

Each variety conforms to the following description and tests:

Specific gravity for Liquid Petrolatum 0.828 to 0.905 at 25° C.

A colorless, transparent, oily liquid, free, or nearly free, from fluorescence, odorless and tasteless when cold, and possessing not more than a faint petroleum odor when heated.

When cooled to 10° C., Liquid Petrolatum does not become more than opalescent (*solid paraffins*).

Insoluble in water or alcohol; soluble in ether, chloroform, petroleum benzin, or in fixed or volatile oils. Camphor, menthol, thymol, and many similar substances are dissolved by Liquid Petrolatum.

Boil 10 mils of Liquid Petrolatum with an equal volume of alcohol; the alcoholic liquid is not acid to litmus (*acids*).

Introduce into a glass-stoppered cylinder, which has been previously rinsed with sulphuric acid, 5 mils of Liquid Petrolatum and 5 mils of colorless sulphuric acid, heat in a water bath during ten minutes, shaking well at intervals of thirty seconds; the oil remains unchanged in color and the acid does not become darker than pale amber (*carbonizable impurities*).

Prepare a clear, colorless saturated solution of lead oxide in an aqueous solution of sodium hydroxide (1 in 5), and mix 2 drops of this solution with 4 mils of Liquid Petrolatum and 2 mils of dehydrated alcohol; the mixture does not darken after heating for ten minutes at 70° C. and cooling (*sulphur compounds*).

Viscosity—Make a permanent mark about 2 cm. below the bulb of a 50 mil pipette of the usual type and note the time, in seconds, required at 25° C. for the level of distilled water to fall from the upper to the lower mark as the liquid flows from the pipette. The time should not be less than twenty-five seconds nor more than thirty seconds for the pipette selected.

Draw the Liquid Petrolatum to be tested into this pipette, which should be clean and dry, and note the time, in seconds, required at 25° C. for its level to fall from the same upper to the lower mark as used for the water. Divide the number of seconds thus noted by the number of seconds required for water to fall from the upper to the lower mark, as above determined. The quotient indicates the viscosity. Distilled water at 25° C. is taken as 1.

AVERAGE DOSE—Metric, 15 mils—Apothecaries, 4 fluidrachms.

PETROSELINUM

Parsley Fruit

Petrosel.—Parsley Seed

The dried ripe fruit of *Petroselinum sativum* Hoffman (Fam. *Umbelliferæ*), without the presence or admixture of more than 5 per cent. of foreign seeds or other matter. Preserve Parsley Fruit carefully in tightly-closed containers, protected from light.

Mericarps usually separated, ovoid-crescent shaped, from 2 to 3 mm. in length and about 1 mm. in diameter; externally grayish-brown, becoming grayish or brownish on aging, having 5 yellowish, filiform, prominent ribs, alternating with the coarsely roughened furrows; in transverse section nearly hemispherical, the commissural surface with 2 vittæ or oil-tubes, the dorsal surface usually with a single vitta, occasionally 2 vittæ in the grooves between the primary ribs; endosperm large, oily, enclosing a small embryo; odor and taste characteristic and aromatic, especially when bruised.

Under the microscope, sections of Parsley Fruit show an epidermal layer with thick cuticularized walls having numerous small centrifugal projections; several layers of small, thin-walled parenchyma cells, being usually considerably collapsed and occasionally containing a rosette aggregate of calcium oxalate; a single, large, brown, elliptical vitta or oil-tube between each of the primary ribs and surrounded by a layer of comparatively large, yellowish-brown, tangentially elongated cells; a single fibro-vascular bundle more or less surrounded by a few or occasionally numerous sclerenchymatous fibers; inner epidermis of narrow, thin-walled elongated cells closely cohering with the brownish tabular cells of the seed-coat; commissural surface usually with 2 large vittæ, a very few stone cells and showing a slight separation of pericarp and seed-coat; endosperm of polygonal, thick-walled parenchyma cells containing fixed oil and numerous, small aleurone grains usually containing a small rosette aggregate of calcium oxalate. The vittæ usually contain yellowish oil globules or a resin-like mass adhering to the walls, and occasionally are divided by a radial wall.

The powder is grayish-brown; mostly of large, irregular fragments; cells of endosperm with aleurone grains, each usually containing a rosette aggregate of calcium oxalate, from 0.003 to 0.007 mm. in diameter; fragments with light yellow vittæ and the yellowish-brown cells of the pericarp; fragments with narrow tracheæ and more or less lignified sclerenchymatous fibers.

Preparation—Oleoresina Petroselini.

PHENOL

Phenol

Carbolic Acid

Hydroxybenzene obtained from coal-tar or made synthetically. It contains not less than 97 per cent. of C_6H_5OH (94.05). Preserve it in well-closed containers, protected from light.

Phenol occurs in colorless, interlaced, or separate needle-shaped crystals, or as a white, crystalline mass, sometimes acquiring a red tint; having a characteristic, somewhat aromatic odor. When undiluted it cauterizes and whitens the skin and mucous membrane.

One Gm. of Phenol dissolves in about 15 mils of water at 25° C.; very soluble in alcohol, glycerin, chloroform, ether, carbon disulphide, or in fixed or volatile oils.

An aqueous solution of Phenol (1 in 15) is clear and neutral or at most only faintly acid to litmus.

When gently heated Phenol melts, forming a highly refractive liquid. It is also liquefied by the addition of about 8 per cent. of water.

Congealing point: not below 38° C.

Its aqueous solution yields with bromine water a white precipitate of tribromphenol, which at first redissolves, but becomes permanent as more of the reagent is added, and appears crystalline when viewed under the microscope.

Add 1 drop of ferric chloride T.S. to 10 mils of an aqueous solution of Phenol (1 in 100); the liquid acquires a violet-blue color.

Heat about 10 Gm. of Phenol on a water bath; it is volatilized without leaving more than 0.05 per cent. of residue. The vapor is inflammable.

Assay—Dissolve about 1.5 Gm. of the Phenol to be assayed, accurately weighed, in sufficient distilled water to make 1000 mils. Transfer an aliquot portion of this solution, containing not less than 0.038 Gm. nor more than 0.041 Gm. of Phenol, to a 500 mil glass-stoppered flask having a long, narrow neck, add 30 mils of tenth-normal bromine V.S., then 5 mils of hydrochloric acid and immediately insert the stopper. Shake the flask repeatedly during half an hour, allow it to stand for fifteen minutes, remove the stopper just sufficiently to introduce quickly 5 mils of an aqueous solution of potassium iodide (1 in 5), being careful that no bromine vapor escapes, and at once stopper the flask. Shake the latter thoroughly, remove the stopper and rinse it and the neck of the flask with a little distilled water, so that the washings may flow into the flask, then add 1 mil of chloroform, shake the mixture well and titrate with tenth-normal sodium thiosulphate V.S., using starch T.S. as indicator. It shows not less than 97 per cent. of C_6H_5OH.

Each mil of tenth-normal bromine V.S. corresponds to 0.001568 Gm. of C_6H_5OH. Each gramme of Phenol corresponds to not less than 618.6 mils of tenth-normal bromine V.S.

Preparations—Glyceritum Phenolis Phenol Liquefactum Unguentum Phenolis (from Liquefied Phenol).

AVERAGE DOSE—Metric, 0.06 Gm.—Apothecaries, 1 grain.

PHENOL LIQUEFACTUM

Liquefied Phenol

Phenol Liq.—Liquefied Carbolic Acid

A liquid containing not less than 87 per cent. of C_6H_5OH (94.05).

PHENOL, *a convenient quantity.*

DISTILLED WATER, *a sufficient quantity.*

Liquefy the phenol by placing the unstoppered container in a water bath, and applying heat gradually until the crystals have melted; transfer the liquid to a tared vessel and weigh it; then add for each *nine grammes* of phenol *one gramme* of distilled water and mix thoroughly. Preserve it in well-closed containers, protected from light.

Liquefied Phenol is a colorless liquid, which may develop a red tint upon keeping. It has a characteristic, somewhat aromatic odor. When undiluted it cauterizes and whitens the skin and mucous membrane.

Liquefied Phenol is miscible with alcohol, ether, or glycerin. When it is diluted with an equal volume of glycerin, the mixture is miscible with water.

Specific gravity: about 1.065 at 25° C.

When subjected to distillation, the boiling point does not rise above 182° C.

In other respects Liquefied Phenol responds to the tests for identity and purity under *Phenol* (omitting the congealing point).

Assay—Proceed as directed under *Phenol.*

Each gramme of Liquefied Phenol corresponds to not less than 554.8 mils of tenth-normal bromine V.S.

Preparation—Unguentum Phenolis.

AVERAGE DOSE—Metric, 0.05 mil—Apothecaries, 1 minim.

PHENOLPHTHALEINUM

Phenolphthalein

Phenolphthal.

A dibasic phenol derivative (dihydroxyphthalophenone) [$C_{20}H_{14}O_4$ or $(C_6H_4OH)_2CO.C_6H_4CO = 318.11$].

Phenolphthalein occurs as a white or faintly yellowish-white, crystalline powder; odorless and tasteless; permanent in the air.

One Gm. of Phenolphthalein dissolves in 13 mils of alcohol, and in about 70 mils of ether at 25° C.; almost insoluble in water.

Melting point: not below 253° C.

It is dissolved by solutions of the alkali hydroxides and carbonates with a red color. The solutions are decolorized by the addition of acids in excess or by heating with zinc dust.

Incinerate about 2 Gm. of Phenolphthalein; not more than 0.05 per cent. of ash remains.

A solution of 0.5 Gm. of Phenolphthalein in 30 mils of alcohol is colorless.

One-half Gm. of Phenolphthalein dissolves completely in a mixture of 4 mils of sodium hydroxide T.S. and 50 mils of distilled water (*fluorane*).

A mixture of 250 mils of cold, recently boiled, distilled water and 0.5 mil of a solution of Phenolphthalein (1 in 100) in diluted alcohol requires not more than 0.5 mil of hundredth-normal potassium hydroxide V.S. to produce a pink coloration.

Heat about 0.5 Gm. of Phenolphthalein on a water bath for five minutes with 10 mils of diluted hydrochloric acid, filter the liquid and evaporate the filtrate to dryness; the residue, when dissolved in 25 mils of distilled water, slightly acidulated with hydrochloric acid, does not respond to the Test for heavy metals (see Part II, Test No. 3).

Heat a crucible to redness and introduce, in small portions, an intimate mixture of 0.2 Gm. of Phenolphthalein, about 0.5 Gm. of potassium nitrate, and about 0.3 Gm. of anhydrous sodium carbonate. Maintain a red heat until the reaction ceases, then boil the cooled residue for five minutes with 10 mils of diluted sulphuric acid, filter, and wash the undissolved residue with 10 mils of distilled water. Evaporate the filtrate and washings until sulphuric acid vapors begin to evolve. The residue, dissolved in 5 mils of distilled water, meets the requirements of the Test for arsenic (see Part II, Test No. 1).

AVERAGE DOSE—Metric, 0.15 Gm.—Apothecaries, 2½ grains.

PHENYLIS SALICYLAS

Phenyl Salicylate

Phenyl. Salicyl.—Salol

The phenyl ester [$C_{13}H_{10}O_3$ or $C_6H_4(OH)COOC_6H_5$ 1 : 2 = 214.08] of salicylic acid. Preserve it in well-closed containers in a cool place.

Phenyl Salicylate is a white, crystalline powder, having an aromatic odor and a characteristic taste.

One Gm. of Phenyl Salicylate dissolves in 6670 mils of water and in 6 mils of alcohol at 25° C.; very soluble in chloroform, ether, benzene, or in fixed or volatile oils.

It melts between 41° and 43° C.

The addition of diluted ferric chloride T.S. to an alcoholic solution of the salt (1 in 20) produces a violet color.

Dissolve from 0.2 to 0.3 Gm. of Phenyl Salicylate in 2 mils of hot sodium hydroxide T.S., and acidify the solution with hydrochloric acid; salicylic acid separates and the odor of phenol is recognizable.

Incinerate about 2 Gm. of Phenyl Salicylate; not more than 0.05 per cent. of ash remains.

Phenyl Salicylate does not redden moistened blue litmus paper (*free acids*).

Shake about 1 Gm. of Phenyl Salicylate with 50 mils of distilled water and filter the liquid; the addition of 1 drop of ferric chloride T.S. to 10 mils of the filtrate produces no violet color (*uncombined phenol or salicylic acid*).

Ten mil portions of the same filtrate tested separately with barium nitrate T.S. and silver nitrate T.S. show no turbidity (*sulphate or chloride*).

AVERAGE DOSE—Metric, 0.3 Gm.—Apothecaries, 5 grains.

PHOSPHORUS

Phosphorus

Phosphor.

Phosphorus [P = 31.04] must be carefully preserved under water, in strong, well-closed containers, in a secure and moderately cool place, protected from light.

Phosphorus is a translucent, nearly colorless solid, of a waxy luster, having at ordinary temperatures about the consistence of beeswax. By long keeping the surface becomes white or red, and occasionally black. It has a distinctive and disagreeable odor and taste, *but should not be tasted, except in very dilute solution.*

When exposed to the air, it emits white fumes, which are luminous in the dark, and have an odor somewhat resembling that of garlic; on longer exposure to the air, it often takes fire spontaneously.

Specific gravity: about 1.830 at 10° C.

It melts at about 44° C.

One Gm. of Phosphorus dissolves in about 400 mils of dehydrated alcohol, about 17 mils of chloroform, 102 mils of absolute ether, 31.5 mils of benzene, and in 0.9 mil of carbon disulphide at 25° C.; sparingly soluble in fixed oils. It is almost insoluble in water, to which it imparts its characteristic disagreeable odor and taste.

Add 1 Gm. of Phosphorus to 10 mils of nitric acid, diluted with 10 mils of distilled water, in a flask having a capacity of 50 mils, and digest the mixture at a gentle heat on a water bath until the Phosphorus is dissolved, passing a current of carbon dioxide into the flask over the surface of the liquid during the heating. Transfer this solution to a dish, evaporate it until nitrous vapors are no longer given off, and then dilute the solution to 250 mils with distilled water. One mil of this solution meets the requirement of the Test for arsenic (see Part II, Test No. 1).

Add barium chloride T.S. to another portion of the latter solution; not more than a slight opalescence is produced (*sulphur*).

Preparation—Pilulæ Phosphori.

AVERAGE DOSE—Metric, 0.0005 Gm.—Apothecaries, $\frac{1}{120}$ grain.

PHYSOSTIGMA

Physostigma

Physostig.—Calabar Bean Ordeal Bean

The dried ripe seeds of *Physostigma venenosum* Balfour (Fam. *Leguminosæ*), yielding not less than 0.15 per cent. of the alkaloids of Physostigma.

Oblong or ellipsoidal, somewhat compressed reniform, from 15 to 30 mm. in length and from 10 to 15 mm. in thickness; externally reddish or chocolate brown, smooth, somewhat wrinkled near the brownish-black groove, the latter being about 2 mm. in width and extending almost the entire length of the convex edge and in which are found frequently the remains of the white membranous funiculus, the margins of the seed-coat on both sides of the groove somewhat elevated, of a yellowish-red or brownish-red color and somewhat thickened; embryos large, white, with short hypocotyl and two concavo-convex cotyledons; taste at first starchy, afterwards acrid.

The powder is grayish-white, starch grains numerous, from 0.005 to 0.15 mm. in diameter, ellipsoidal or somewhat reniform, and usually with a distinct cleft and frequently with radiating or irregular fissures; fragments of seed-coat with very thick, reddish-brown cells, being either palisade-like or very irregular and resembling stone cells, but the walls are not lignified; an occasional fragment with tracheæ showing reticulate thickenings.

Physostigma yields not more than 3 per cent. of ash.

Assay—Introduce 15 Gm. of Physostigma in No. 60 powder, into a flask of about 250 mils capacity, and add 150 mils of ether. Stopper the flask, shake it well and allow it to stand ten minutes, then add 10 mils of an aqueous solution of sodium bicarbonate (1 in 20) and shake the mixture vigorously at intervals during four hours. Now add 15 mils of distilled water, again shake the flask well, and, when the drug has settled, decant 100 mils of the ether solution, representing 10 Gm. of Physostigma. Filter the solution through a pledget of purified cotton into a beaker and rinse the graduate and cotton with ether. Add 20 mils of tenth-normal sulphuric acid V.S. and evaporate off the ether, stirring during the evaporation with a rubber-tipped glass rod. After the resinous and fatty matter has agglutinated, pour off the acid solution through a wetted filter into a separator. Redissolve the residue in the beaker in about 15 mils of ether, add 2 mils of tenth-normal sulphuric acid V.S., evaporate off the ether with continued stirring as before and pour the acid solution on the filter. Repeat this operation until all of the alkaloid is extracted and then wash the filter with distilled water until it is free from alkaloids. Collect the solution and washings in a separator, add sufficient sodium bicarbonate to make the solution decidedly alkaline to litmus and completely extract the alkaloids by shaking it out repeatedly with ether. Wash the combined ether solutions with 10 mils of distilled water, separate the water completely, and filter the ether solution, washing the container and filter with ether. Evaporate the ether solution to dryness, dissolve the alkaloids from the residue in exactly 5 mils of tenth-normal sulphuric acid V.S. and titrate the excess of acid with fiftieth-normal potassium hydroxide V.S., using cochineal T.S. as indicator.

Each mil of tenth-normal sulphuric acid V.S. consumed corresponds to 27.52 milligrammes of the alkaloids of Physostigma (see Part II, Proximate Assays, No. 15).

Preparations—Extractum Physostigmatis Tinctura Physostigmatis.

AVERAGE DOSE—Metric, 0.1 Gm.—Apothecaries, 1½ grains.

PHYSOSTIGMINÆ SALICYLAS

Physostigmine Salicylate

Physostig. Salicyl.—Eserine Salicylate

The salicylate [$C_{15}H_{21}O_2N_3.C_7H_6O_3 = 413.25$] of an alkaloid obtained from physostigma. Preserve it in small, well-closed containers, protected from light.

Physostigmine Salicylate occurs in colorless or faintly yellowish, shining, acicular, or short columnar crystals; odorless. It acquires a red tint when long exposed to light and air. *Great caution must be used in tasting it.*

One Gm. of Physostigmine Salicylate dissolves in 75 mils of water, 16 mils of alcohol, 6 mils of chloroform, and in 250 mils of ether at 25° C.; also in 16 mils of water at 80° C. and in 5 mils of boiling alcohol.

Its cold, saturated aqueous solution is neutral or at most only faintly acid to litmus. Upon standing twenty-four hours, this solution usually acquires a pink color. This color is produced rapidly by the addition of a few drops of sodium hydroxide T.S.

Ferric chloride T.S. produces a deep violet color in an aqueous solution of Physostigmine Salicylate; a solution of chlorinated lime added to an aqueous solution of the salt produces a red color.

Evaporate about 0.005 Gm. of the salt to dryness with a few drops of ammonia water; a blue residue is produced, which is soluble in alcohol, and, when so dissolved, yields a red, fluorescent solution upon the addition of acetic acid in excess.

No weighable ash remains on incinerating 0.1 Gm. of Physostigmine Salicylate.

Precipitate the salicylic acid from 10 mils of a cold, saturated aqueous solution of the salt with a slight excess of hydrochloric acid and filter the mixture; the filtrate is not rendered turbid at once by the addition of a few drops of barium chloride T.S. (*sulphate*).

A solution of about 0.1 Gm. of Physostigmine Salicylate in 2 mils of sulphuric acid does not become darker than yellow within five minutes (*readily carbonizable impurities*).

AVERAGE DOSE—Metric, 0.001 Gm.—Apothecaries, 1⁄60 grain.

PILOCARPINÆ HYDROCHLORIDUM

Pilocarpine Hydrochloride

Pilocarpin. Hydrochl.—Pilocarpine Chloride

The hydrochloride ($C_{11}H_{16}O_2N_2.HCl = 244.62$) of an alkaloid obtained from pilocarpus. Preserve it in well-closed containers, protected from light.

Pilocarpine Hydrochloride occurs in colorless, translucent crystals, odorless and having a faintly bitter taste; hygroscopic on exposure to the air.

One Gm. of Pilocarpine Hydrochloride dissolves in 0.3 mil of water, 3 mils of alcohol, and in 366 mils of chloroform at 25° C.; also in 1.5 mils of alcohol at 60° C.; insoluble in ether.

Its aqueous solution (1 in 20) is neutral or at most only slightly acid to litmus.

When dried to constant weight at 100° C. it melts between 195° and 198° C.

Silver nitrate T.S. produces in an aqueous solution of the salt a white precipitate, insoluble in nitric acid.

Dissolve 0.01 to 0.02 Gm. of Pilocarpine Hydrochloride in 2 mils of distilled water in a test tube, add 2 mils of a slightly acid solution of hydrogen dioxide, and then cover the mixture with a small layer of benzene. Now add 3 or 4 drops of a solution of potassium dichromate (1 in 300) and shake the mixture gently; the benzene layer acquires a violet color, while the aqueous layer remains yellow (distinction from *other alkaloids*). (If more than 0.02 Gm. of the salt is used, the benzene turns blue, and the reaction is no longer characteristic.)

No weighable ash remains on incinerating 0.1 Gm. of Pilocarpine Hydrochloride.

A solution of about 0.1 Gm. of the salt in 2 mils of sulphuric acid is colorless or at most only faintly yellow (*readily carbonizable impurities*).

The addition of ammonia water or potassium dichromate T.S. to 10 mils of an aqueous solution of the salt (1 in 100) produces no turbidity (*various foreign alkaloids*).

		Metric	Apothecaries
AVERAGE DOSE—	By mouth,	0.01 Gm.—	1⁄6 grain.
	Hypodermic,	0.005 Gm.—	1⁄12 grain.

PILOCARPINÆ NITRAS

Pilocarpine Nitrate

Pilocarpin. Nit.

The nitrate [$C_{11}H_{16}O_2N_2.HNO_3 = 271.17$] of an alkaloid obtained from pilocarpus. Preserve it in well-closed containers, protected from light.

Pilocarpine Nitrate occurs in shining crystals; odorless; permanent in the air.

One Gm. of Pilocarpine Nitrate dissolves in 4 mils of water and in 75 mils of alcohol at 25° C.; also in 21 mils of alcohol at 60° C.; insoluble in chloroform or ether.

It melts between 170° and 173° C.

Carefully pour an aqueous solution of the salt, mixed with an equal volume of ferrous sulphate T.S., over sulphuric acid without shaking; a brown ring appears at the juncture of the two layers.

The addition of a few drops of silver nitrate T.S. to 5 mils of an aqueous solution of the salt (1 in 20), acidulated with nitric acid, produces not more than an opalescence (*chloride*).

In other respects the salt responds to the tests for identity and purity under *Pilocarpinæ Hydrochloridum.*

		Metric	Apothecaries
AVERAGE DOSE—	By mouth,	0.01 Gm.—	1/6 grain.
	Hypodermic,	0.005 Gm.—	1/12 grain.

PILOCARPUS

Pilocarpus

Pilocarp.—Jaborandi

The dried leaflets of *Pilocarpus Jaborandi* Holmes, known in commerce as Pernambuco Jaborandi, or of *Pilocarpus microphyllus* Stapf, known in commerce as Maranham Jaborandi (Fam. *Rutaceæ*), without the presence or admixture of more than 5 per cent. of the stalks bearing the leaflets and stems of the same plant, or other matter, and yielding not less than 0.6 per cent. of the alkaloids of Pilocarpus.

Pernambuco Jaborandi—Leaflets when entire, oval, oblong, or elliptical, from 4 to 10.5 cm. in length and from 2 to 4 cm. in breadth and with short, stout petiolules; summits more or less rounded or acute and emarginate; bases rounded or acute and mostly unequal; margins entire and narrowly revolute; very smooth, shiny, coriaceous and glandular-punctate; upper surfaces grayish to brownish-green, midribs mostly depressed, under surfaces yellowish- or greenish-brown and slightly pubescent on the prominent midvein; peculiarly aromatic when crushed; taste bitterish, becoming somewhat pungent and having a sialogogue effect.

Maranham Jaborandi—Leaflets rhomboidally oval to obovate or elliptical, from 1.5 to 5 cm. in length and from 1 to 3 cm. in breadth, the lateral ones nearly sessile, the terminal ones on margined petiolules, from 0.5 to 1.5 cm. in length; of a nearly uniform grayish or yellowish-green color, rather thin but otherwise resembling Pernambuco Jaborandi.

Under the microscope, transverse sections of Pilocarpus show the upper epidermal cells with a yellowish layer of cutin from 0.005 to 0.01 mm. in thickness; palisade cells, 1 to 3 rows deep, being filled with chloroplastids; among the palisade cells occur large, nearly circular, oil-secretion reservoirs from 0.08 to 0.15 mm. in diameter; the dorsal pneumatic layer, from 10 to 20 rows in depth, the cells occasionally containing rosette aggregates of calcium oxalate from 0.01 to 0.025 mm. in diameter; distributed in the center of the leaf, are the collateral fibro-vascular bundles each surrounded by a more or less interrupted circle of several rows of thick-walled, slightly lignified bast-fibers; tracheæ associated with strongly lignified wood-fibers; among the cells of the lower epidermis occur numerous stomata. On surface view the stomata are broadly elliptical, from 0.025 to 0.04 mm. in length, being uniformly smaller in Maranham Jaborandi. Upon both surfaces of Pernambuco Jaborandi occur a number of non-glandular, one-celled hairs, more or less bent or curved, from 0.08 to 0.5 mm. in length, thick-walled and with numerous, slight, centrifugal projections.

The powder is dark green or greenish-brown; epidermal cells on surface view 5- or 6-sided; stomata broadly elliptical, from 0.02 to 0.04 mm. in length, usually with four neighboring cells; fragments of fibro-vascular bundles showing tracheæ with simple or bordered pores or spiral thickenings, associated with thick-walled and strongly lignified wood-fibers; bast-fibers few, walls thick and only slightly lignified; calcium oxalate in rosette aggregates, from 0.01 to 0.025 mm. in diameter; fragments of laminæ showing large, oil-secretion reservoirs and usually containing one or more globules of oil; non-glandular hairs having thick walls, usually more or less broken, are occasionally found.

Pilocarpus yields not more than 7 per cent. of ash.

Assay—Introduce 15 Gm. of Pilocarpus in No. 60 powder into a 250 mil flask, add 150 mils of chloroform and proceed as directed under *Belladonnæ Radix*, page 73, third line of the assay, beginning with the word "Stopper," and decreasing the amount of water to be added after maceration to 5 mils. The 100 mils of chloroform solution must be drawn off from the bottom of the flask, and dissolve the alkaloids from the residue in 8 mils of tenth-normal sulphuric acid V.S.

Each mil of tenth-normal sulphuric acid V.S. corresponds to 20.8 milligrammes of the alkaloids of Pilocarpus.

Preparation—Fluidextractum Pilocarpi.

AVERAGE DOSE—Metric, 2 Gm.—Apothecaries, 30 grains.

PILULÆ ALOES

Pills of Aloes

Pil. Aloes

ALOES, in fine powder, *thirteen grammes*	13 Gm.
SOAP, in fine powder, *thirteen grammes*	13 Gm.
WATER, a *sufficient quantity,*	
To make *one hundred pills*	100

Mix the powders intimately, then incorporate sufficient water to form a mass, and divide it into *one hundred pills.*

AVERAGE DOSE—2 pills.

PILULÆ ASAFŒTIDÆ

Pills of Asafetida

Pil. Asafœt.

Asafetida, *twenty grammes*	20 Gm.
Soap, in fine powder, *six grammes*	6 Gm.
Water, *a sufficient quantity,*	
To make *one hundred pills*	100

Beat the solids together with water, so as to form a mass, and divide it into *one hundred pills.*

Average dose—2 pills.

PILULÆ CATHARTICÆ COMPOSITÆ

Compound Cathartic Pills

Pil. Cathart. Co.

Compound Extract of Colocynth, *eighty grammes*	80 Gm.
Mild Mercurous Chloride, *sixty grammes*	60 Gm.
Resin of Jalap, in fine powder, *twenty grammes*	20 Gm.
Gamboge, in fine powder, *fifteen grammes*	15 Gm.
Diluted Alcohol, *a sufficient quantity,*	
To make *one thousand pills*	1000

Mix the powders intimately, then incorporate a sufficient quantity of diluted alcohol to form a mass, and divide it into *one thousand pills.*

Average dose—2 pills.

PILULÆ FERRI CARBONATIS

Pills of Ferrous Carbonate

Pil. Ferr. Carb.—Chalybeate Pills Blaud's Pills Ferruginous Pills

Each Pill contains not less than 0.06 Gm. of $FeCO_3$.

Granulated Ferrous Sulphate, *sixteen grammes*	16 Gm.
Potassium Carbonate, *eight grammes*	8 Gm.
Sugar, *four grammes*	4 Gm.
Tragacanth, in fine powder, *one gramme*	1 Gm.
Althæa, in fine powder, *one gramme*	1 Gm.
Glycerin,	
Water, each, *a sufficient quantity,*	
To make *one hundred pills*	100

Rub the potassium carbonate, in a mortar, with a sufficient quantity (about *five drops* each) of glycerin and water, then add the ferrous sulphate and sugar, previously triturated together to a uniform, fine powder, and rub the mass thoroughly, until it assumes a greenish color. When the reaction is complete, incorporate the tragacanth and althæa, and, if necessary, add a little more water, so as to obtain a mass of pilular consistence. Divide this into *one hundred pills.*

Note—In this process the 8 Gm. of potassium carbonate may be replaced by 7.2 Gm. of monohydrated sodium carbonate.

Assay—Dissolve three Pills in 15 mils of diluted sulphuric acid and dilute the solution with distilled water to about 100 mils. The immediate titration with tenth-normal potassium dichromate V.S., potassium ferricyanide T.S. being used as indicator, shows not less than 0.06 Gm. of $FeCO_3$ in each pill.

Each mil of tenth-normal potassium dichromate V.S. used corresponds to 0.011584 Gm. of $FeCO_3$. Each Pill of Ferrous Carbonate corresponds to 5.2 mils of tenth-normal potassium dichromate V.S.

Average dose—2 pills.

PILULÆ FERRI IODIDI

Pills of Ferrous Iodide

Pil. Ferr. Iod.

Reduced Iron, *four grammes*	4 Gm.
Iodine, *five grammes*	5 Gm.
Glycyrrhiza, in fine powder, *four grammes*	4 Gm.
Sugar, in fine powder, *four grammes*	4 Gm.
Extract of Glycyrrhiza, in fine powder, *one gramme*	1 Gm.
Acacia, in fine powder, *one gramme*	1 Gm.
Water,	
Balsam of Tolu,	
Ether, each, *a sufficient quantity,*	
To make *one hundred pills*	100

Add *six mils* of water to the reduced iron, contained in a small mortar, and then, gradually add the iodine, stirring constantly until the liquid ceases to have a reddish tint. Then add the remaining powders, previously well triturated together, and mix the whole thoroughly. Transfer the mass to a porcelain dish, evaporate the excess of moisture on a water bath, with constant stirring, and when the mass has acquired a pilular consistence divide it into *one hundred pills.*

Dissolve *ten grammes* of balsam of tolu in *fifteen mils* of ether, shake the pills with a sufficient quantity of this solution until they are uniformly coated, and put them on a plate to dry, occasionally rolling them about until the drying is completed.

Keep the pills in a well-stoppered bottle.

Pills of Ferrous Iodide are free from the odor of iodine.

Triturate a few of the pills with water, and filter the liquid; the filtrate does not assume more than a light blue tint upon the addition of starch T.S. (absence of more than traces of *free iodine*).

AVERAGE DOSE—2 pills.

PILULÆ PHOSPHORI

Pills of Phosphorus

Pil. Phosphor.

PHOSPHORUS, *six-hundredths of a gramme*	0.06 Gm.
ALTHÆA, in No. 60 powder, *six grammes*	6.00 Gm.
ACACIA, in fine powder, *three grammes*	3.00 Gm.
CHLOROFORM,	
GLYCERIN,	
WATER,	
BALSAM OF TOLU,	
ETHER, each, *a sufficient quantity,*	
To make *one hundred pills*	100

Dissolve the phosphorus, in a test tube, in *five mils* of chloroform, with the aid of a very gentle heat, replacing from time to time any of the chloroform which may be lost by evaporation. Mix the althæa and acacia in a mortar, next add the solution of phosphorus, then immediately afterwards a sufficient quantity (about *four mils*) of a mixture of *two volumes* of glycerin and *one volume* of water, and quickly form a mass; divide it into *one hundred pills.*

Dissolve *ten grammes* of balsam of tolu in *fifteen mils* of ether, shake the pills with a sufficient quantity of this solution until they are uniformly coated, and put them on a plate to dry, occasionally rolling them about until the drying is completed.

Keep the pills in a well-stoppered bottle.

AVERAGE DOSE—1 pill.

PILULÆ RHEI COMPOSITÆ

Compound Pills of Rhubarb

Pil. Rhei Co.

RHUBARB, in No. 80 powder, *thirteen grammes*	13.0 Gm.
ALOES, in fine powder, *ten grammes*	10.0 Gm.

Myrrh, in fine powder, *six grammes*		6.0 Gm.
Oil of Peppermint, *five-tenths of a milliliter*		0.5 mil
Water, *a sufficient quantity,*		
To make *one hundred pills*	100	

Mix the oil of peppermint intimately with the powders, then incorporate sufficient water to form a mass; divide it into *one hundred pills*.

Average dose—2 pills.

PIPER

Pepper

Black Pepper

The dried, unripe fruit of *Piper nigrum* Linné (Fam. *Piperaceæ*), without the presence or admixture of more than 2 per cent. of stems or other foreign matter.

Nearly globular, from 3.5 to 6 mm. in diameter, epicarp very thin, easily separable from the sarcocarp; externally blackish-brown or grayish-black, coarsely reticulate; unilocular, 1-seeded; seed nearly white, hollow, adhering to the pericarp; odor aromatic, slightly empyreumatic; taste aromatic and very pungent.

The powder is a mixture of blackish-brown fragments of the pericarp and nearly white fragments of the endosperm and embryo; starch grains spherical or somewhat angular, from 0.001 to 0.003 mm. in diameter, mostly in the polygonal cells of the endosperm; stone cells of the epicarp varying from nearly isodiametric or palisade-like to long tapering or somewhat irregular in shape, with thick porous walls and large lumina frequently containing a reddish-brown pigment; stone cells of the endocarp unevenly thickened, the outer walls being usually rather thin, and the lumina usually filled with a reddish-brown substance; oil cells with suberized walls and containing a yellowish oil, from which monoclinic prisms of piperine occasionally separate.

Pepper yields not less than 6 per cent. of non-volatile extract, soluble in ether (see Part II, Test No. 13). It contains not less than 25 per cent. of starch.

Pepper yields not more than 7 per cent. of ash. The amount of ash in Pepper, insoluble in diluted hydrochloric acid, does not exceed 2 per cent. of the weight of Pepper taken.

Preparation—Oleoresina Piperis.

Average dose—Metric, 0.5 Gm.—Apothecaries, 8 grains.

PIX LIQUIDA

Tar

Pix Liq.—Pine Tar

A product obtained by the destructive distillation of the wood of *Pinus palustris* Miller, or of other species of *Pinus* (Fam. *Pinaceæ*).

Tar is semi-liquid, viscid, blackish-brown, non-crystalline, translucent in thin layers, becoming granular and opaque with age; odor empyreumatic, terebinthinate, taste sharp and empyreumatic.

Tar is miscible with alcohol, ether, chloroform, glacial acetic acid, or fixed or volatile oils; it is heavier than water and is slightly soluble in it, the solution being of a pale yellowish to yellowish-brown color and acid to litmus.

The addition of a drop of ferric chloride T.S. to 10 mils of an aqueous solution of tar produces a greenish-brown color.

Preparations—Syrupus Picis Liquidæ Unguentum Picis Liquidæ.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

PLUMBI ACETAS

Lead Acetate

Plumb. Acet.—Sugar of Lead

It contains not less than 85.31 per cent. nor more than 89.57 per cent. of anhydrous lead acetate, corresponding to not less than 99.5 per cent. of the crystallized salt [$Pb(C_2H_3O_2)_2+3H_2O=379.20$]. Preserve it in well-closed containers.

Lead Acetate occurs as colorless, shining, transparent, monoclinic prisms or plates, or as heavy, white, crystalline masses, or granular crystals, having a faintly acetous odor, and a sweetish, astringent, afterwards metallic taste; efflorescent, and absorbing carbon dioxide on exposure to the air.

One Gm. of Lead Acetate dissolves in 1.4 mils of water, and in 38 mils of alcohol at 25° C.; also in about 0.5 mil of boiling water; freely soluble in glycerin.

When heated to 40° C. the salt loses its water of crystallization. When heated rapidly to 75° C., it fuses in its water of crystallization, and at a temperature above 280° C. it finally decomposes, leaving a residue of finely divided metallic lead mixed with lead oxide.

An aqueous solution of Lead Acetate (1 in 10) is slightly alkaline to litmus and separate portions yield a black precipitate with hydrogen sulphide T.S., a yellow precipitate with potassium iodide T.S., and a white precipitate with diluted sulphuric acid.

Add 0.1 Gm. of the salt to a mixture of 1 mil of sulphuric acid and 1 mil of alcohol and warm the mixture; ethyl acetate is formed, recognizable by its odor.

A solution of the salt (1 in 10), prepared with distilled water which has been recently boiled, is clear, or only slightly opalescent (*carbonate*) and yields with potassium ferrocyanide T.S. a precipitate which is not perceptibly blue or red (*iron or copper*).

Assay—Dissolve about 5 Gm. of Lead Acetate, accurately weighed, in sufficient recently boiled distilled water to make exactly 100 mils of solution. Mix 10 mils of this solution with 50 mils of tenth-normal oxalic acid V.S. in a 200 mil measuring flask, agitate the mixture thoroughly for five minutes, then fill the flask to the mark with distilled water; filter, and titrate 100 mils of the filtrate (representing one-twentieth of the amount of Lead Acetate originally taken) with tenth-normal potassium permanganate V.S., the filtrate being previously acidulated with 10 mils of sulphuric acid and warmed to 80° C. It shows not less than 85.31 per cent. nor more than 89.57 per cent. of $Pb(C_2H_3O_2)_2$.

Each mil of tenth-normal oxalic acid V.S. used corresponds to 0.016257 Gm. of $Pb(C_2H_3O_2)_2$. Each gramme of Lead Acetate corresponds to not less than 52.5 mils nor more than 55.1 mils of tenth-normal oxalic acid V.S.

Preparation—Liquor Plumbi Subacetatis.

AVERAGE DOSE—Metric, 0.06 Gm.—Apothecaries, 1 grain.

PLUMBI OXIDUM

Lead Oxide

Plumb. Oxid.—Litharge

It contains, when freshly ignited, not less than 96 per cent. of PbO (223.10). Preserve it in well-closed containers.

Lead Oxide occurs as a heavy, yellowish or reddish-yellow powder, or in minute scales, without odor or taste. On exposure to the air it slowly absorbs moisture and carbon dioxide.

Lead Oxide is almost insoluble in water, to which, however, it imparts a faintly alkaline reaction; insoluble in alcohol; dissolved by acetic or diluted nitric acid, and by warm solutions of the fixed alkali hydroxides.

When heated, the Oxide becomes darker in color, but assumes its original color on cooling; it fuses at a red heat. When heated in contact with charcoal, it is reduced to metallic lead.

A solution of the Oxide in diluted nitric acid (1 in 10) is colorless, and, when nearly neutralized by ammonia water, separate portions yield with hydrogen sulphide T.S. a black precipitate,with potassium iodide T.S. a yellow precipitate, and with diluted sulphuric acid a white precipitate.

Shake 5 Gm. of the Oxide in a small flask with 5 mils of distilled water, and add 20 mils of acetic acid. Boil the mixture for a few minutes, filter it, wash the insoluble residue well with diluted acetic acid, and dry it at 110° C.; it weighs not more than 0.15 Gm.

When strongly heated in a porcelain crucible, the Oxide loses not more than 4 per cent. of its weight (*carbonate and moisture*).

Assay—Dissolve about 0.4 Gm. of freshly ignited Lead Oxide, accurately weighed, in 4 mils of acetic acid and 25 mils of recently boiled distilled water, in a 200 mil graduated flask, and mix the solution with 50 mils of tenth-normal oxalic acid V.S. Fill the flask to the mark with distilled water, mix well, filter through a dry filter into a dry flask, rejecting the first 20 mils of filtrate, and titrate 100 mils of the filtrate (representing one-half of the amount of Lead Oxide originally taken) with tenth-normal potassium permanganate V.S., the filtrate being previously acidulated with 20 mils of diluted sulphuric acid and warmed to 80° C. It shows not less than 96 per cent. of PbO.

Each mil of tenth-normal oxalic acid V.S. corresponds to 0.011155 Gm. of PbO. Each gramme of Lead Oxide, after ignition, corresponds to not less than 86.1 mils of tenth-normal oxalic acid V.S.

Preparation—Emplastrum Plumbi.

PODOPHYLLUM

Podophyllum

Podoph.—Mandrake May Apple Rhizome

The dried rhizome and roots of *Podophyllum peltatum* Linné (Fam. *Berberidaceæ*), yielding not less than 3 per cent. of resin.

Rhizome horizontal, nearly cylindrical, jointed, compressed on the upper and lower surfaces, sometimes branched; in pieces from 3 to 20 cm. in length, the internodes from 2 to 9 mm. in diameter; externally dark brown, longitudinally wrinkled or nearly smooth with irregular, somewhat V-shaped scars of scale leaves, nodes annulate, upper portion marked with large, circular, depressed stem-scars and sometimes with buds or stem-bases; at or near the nodes on the lower portion occur numerous root-scars or roots from 2 to 7 cm. in length and about 2 mm. in thickness; fracture short; internally, bark light brown, wood with small yellowish, vascular bundles, pith large and white; odor slight; taste sweetish, disagreeably bitter and acrid.

Under the microscope, a transverse section of the rhizome of Podophyllum shows an outer layer of one or two rows of reddish-brown cells; parenchyma of cortex and pith with numerous single, spherical, polygonal, or 2- to 6-compound starch grains, or rosette aggregates of calcium oxalate; vascular bundles from 24 to 34, arranged in a circle between cortex and pith.

The powder is light brown, with a pronounced and characteristic odor; starch grains numerous, spherical, polygonal or 2- to 6-compound, the individual grains from 0.003 to 0.015 mm. in diameter; calcium oxalate crystals few, in rosette aggregates from 0.05 to 0.08 mm. in diameter and occasionally in raphides from 0.03 to 0.09 mm. in length; tracheæ with simple pores or reticulate thickenings; fragments of starch-bearing parenchyma and reddish-brown cork cells.

Podophyllum yields not more than 3 per cent. of ash.

Assay—Proceed as directed for the preparation of *Resina Podophylli* (see page 358), using 10 Gm. of Podophyllum in No. 60 powder. It shows not less than 3 per cent. of resin.

Preparation—Fluidextractum Podophylli Resina Podophylli.

POTASSA SULPHURATA

Sulphurated Potassa

Pot. Sulphurat.—Liver of Sulphur

A mixture composed chiefly of potassium polysulphides and potassium thiosulphate and containing an amount of sulphides corresponding to not less than 12.8 per cent. of sulphur (S). Preserve it in well-closed containers.

Sulphurated Potassa is in the form of irregular pieces, liver-brown when freshly made, changing to greenish-yellow and finally to gray through absorption of moisture, oxygen, and carbon dioxide from the air. It has a strong odor of hydrogen sulphide and a bitter, acrid, and alkaline taste.

Sulphurated Potassa is very soluble in water, usually leaving a slight residue. Alcohol dissolves only the sulphides.

An aqueous solution of Sulphurated Potassa (1 in 10) is light brown in color and is strongly alkaline to litmus. The addition of an excess of acetic acid to this solution causes a brisk evolution of hydrogen sulphide and a precipitation of sulphur. In the liquid thus treated, after filtration, an excess of sodium bitartrate T.S. produces an abundant, white crystalline precipitate on standing.

Assay—Add a solution of 1 Gm. of crystallized copper sulphate in 15 mils of distilled water to a solution of 1 Gm. of Sulphurated Potassa in 10 mils of distilled water, shake the mixture in a stoppered vessel for a few minutes and filter. The filtrate, acidulated with acetic acid and filtered if necessary, produces no black precipitate with an equal volume of hydrogen sulphide T.S., corresponding to not less than 12.8 per cent. of sulphur combined as sulphides.

POTASSII ACETAS

Potassium Acetate

Pot. Acet.

It contains, when dried to constant weight at 150° C., not less than 99 per cent. of $KC_2H_3O_2$ (98.12). Preserve it in air-tight containers.

Potassium Acetate occurs as a white powder, or in crystalline masses of a satin-like luster; odorless, or with a faint, acetous odor, and having a warming, saline taste. It is very deliquescent on exposure to the air.

One Gm. of Potassium Acetate dissolves in 0.5 mil of water and in 2.9 mils of alcohol at 25° C.; also in about 0.2 mil of boiling water.

An aqueous solution of the salt (1 in 20) is alkaline to litmus, but does not affect phenolphthalein T.S.

When slightly heated, the salt fuses. On strong ignition it is decomposed with the evolution of inflammable empyreumatic vapors and leaves a black residue of potassium carbonate and carbon. This residue imparts to a non-luminous flame a violet color, is alkaline to litmus, and effervesces with acids.

The addition of 5 mils of sodium bitartrate T.S. to 5 mils of an aqueous solution of the salt (1 in 5) causes a white, crystalline precipitate.

Add 0.1 Gm. of the salt to 1 mil of sulphuric acid and 1 mil of alcohol and gently warm the mixture; ethyl acetate is formed, recognizable by its odor.

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

An aqueous solution of the salt meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Assay—Dry the salt to constant weight at 150° C. and proceed as directed under the Assay for alkali salts of organic acids (see Part II, Test No. 6). It shows, in the dried salt, not less than 99 per cent. of $KC_2H_3O_2$.

Each mil of half-normal sulphuric acid V.S. used corresponds to 0.04906 Gm. of $KC_2H_3O_2$. Each gramme of Potassium Acetate, previously dried, corresponds to not less than 20.2 mils of half-normal sulphuric acid V.S.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

POTASSII BICARBONAS

Potassium Bicarbonate

Pot. Bicarb.

It contains, when dried to constant weight in a desiccator over sulphuric acid, not less than 99 per cent. of $KHCO_3$ (100.11). Preserve it in well-closed containers.

Potassium Bicarbonate occurs as colorless, transparent, monoclinic prisms or as a white, granular powder, odorless, and having a saline and slightly alkaline taste. It is permanent in the air.

One Gm. of Potassium Bicarbonate dissolves in 2.8 mils of water at 25° C.; also in 2 mils of water at 50° C.; almost insoluble in alcohol.

An aqueous solution of Potassium Bicarbonate (1 in 10) is slightly alkaline to litmus but is neutral or slightly alkaline to phenolphthalein T.S., and effervesces with acids.

When heated above 50° C., an aqueous solution of the salt rapidly loses carbon dioxide and water, and, at boiling heat, the salt is entirely converted into normal carbonate.

The dry salt begins to lose carbon dioxide and water at 100° C. and this loss increases at a higher temperature, until at a red heat a residue of carbonate remains which imparts a violet color to a non-luminous flame.

An aqueous solution of Potassium Bicarbonate (1 in 10) yields a white, crystalline precipitate of potassium bitartrate with excess of tartaric acid T.S.

Add 2 mils of tenth-normal hydrochloric acid V.S. and 2 drops of phenolphthalein T.S. to 1 Gm. of the salt, dissolved without agitation in 20 mils of distilled water at a temperature not above 15° C.; a red tint does not appear immediately (*carbonate*).

An aqueous solution of the salt (1 in 50), mixed with a slight excess of hydrochloric acid, does not respond to the Test for heavy metals (see Part II, Test No. 3).

Assay—Dissolve about 4 Gm. of Potassium Bicarbonate, previously dried to constant weight in a desiccator over sulphuric acid and accurately weighed, in 25 mils of distilled water and titrate with normal sulphuric acid V.S., methyl orange T.S. being used as indicator. It shows, in the dried salt, not less than 99 per cent. of $KHCO_3$.

Each mil of normal sulphuric acid V.S. used corresponds to 0.10011 Gm. of $KHCO_3$. Each gramme of Potassium Bicarbonate, previously dried, corresponds to not less than 9.9 mils of normal sulphuric acid V.S.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

POTASSII BITARTRAS

Potassium Bitartrate

Pot. Bitart.—Cream of Tartar

It contains, when dried to constant weight at 100° C., not less than 99.5 per cent. of $KHC_4H_4O_6$ (188.14). Preserve it in well-closed containers.

Potassium Bitartrate occurs as colorless or slightly opaque, rhombic crystals, or as a white, somewhat gritty powder; odorless, and having a pleasant, acidulous taste. It is permanent in the air.

One Gm. of Potassium Bitartrate dissolves in 155 mils of water and in 8820 mils of alcohol at 25° C.; also in 16 mils of boiling water.

A saturated aqueous solution of the salt is acid to litmus.

When the salt is heated it chars and emits inflammable vapors having the odor of burning sugar. At a higher temperature, with free access of air, the carbon of the black residue is consumed, and a white, fused mass of potassium carbonate remains, which has an alkaline reaction and effervesces strongly with acids.

With sodium cobaltic nitrite T.S. a saturated aqueous solution of the salt yields a yellow precipitate.

Neutralize a saturated aqueous solution of the salt with potassium hydroxide T.S., add silver nitrate T.S., then just sufficient ammonia water to dissolve the white precipitate and boil the solution; silver is deposited on the sides of the test tube, forming a mirror.

When 0.5 Gm. of the salt is dissolved in 3 mils of ammonia water, no insoluble residue remains (*starch, kaolin, calcium phosphate, or other insoluble matter*).

Ten mils of an aqueous solution of the salt (1 in 50), made with the aid of just sufficient hydrochloric acid, does not respond to the Test for heavy metals (see Part II, Test No. 3).

Ammonia is not evolved on heating the salt with a slight excess of potassium hydroxide T.S.

Mix 1 Gm. of Potassium Bitartrate, in a platinum crucible, with 0.5 mil of sulphuric acid and 1 mil of nitric acid, and heat the mixture until fumes of sulphur trioxide begin to be liberated. Cool the resulting mass and treat it with 10 mils of distilled water and filter. The filtrate, upon being made slightly alkaline with potassium hydroxide T.S., does not yield a gelatinous precipitate soluble in excess of the reagent (*alum*).

Heat 10 Gm. of Potassium Bitartrate with 15 mils of distilled water and add hydrochloric acid until the salt is dissolved, then add 2 mils of sulphurous acid and boil the mixture until the odor of sulphur dioxide is barely perceptible. Cool the solution, mix it with 1 mil of sodium cyanide T.S., and follow this immediately with stronger ammonia water until the precipitate first formed is redissolved and the solution has a slight odor of ammonia. When it is cold, transfer the solution to a glass-stoppered cylinder graduated to 50 mils, dilute it with sufficient distilled water to measure 50 mils, and add 3 drops of sodium sulphide T.S. After mixing well, the color produced in the solution, if any, when viewed downward against a white surface, is not greater than the color of a control solution prepared as follows: Dissolve 2 Gm. of ammonium chloride (see Reagents, Part II) in 20 mils of distilled water, add 4 mils of a solution containing 0.08 Gm. of lead nitrate in 1000 mils of distilled water, and then 1 mil of diluted hydrochloric acid. Treat this solution with the same quantity of hydrochloric acid, sulphurous acid, sodium cyanide T.S., and stronger ammonia water, as used above, transfer it to another 50 mil glass-stoppered cylinder, and then dilute it with sufficient distilled water to make 50 mils and add 3 drops of sodium sulphide T.S. (before adding the sodium sulphide T.S., the liquid must possess a distinct odor of ammonia and the two cylinders used must be matched, be of practically colorless glass and have the same internal diameter) (*lead*).

Assay—Dissolve about 6 Gm. of Potassium Bitartrate, previously dried to constant weight at 100° C. and accurately weighed, in 100 mils of boiling distilled water, and titrate with normal potassium hydroxide V.S., using phenolphthalein T.S as indicator. It shows, in the dried salt, not less than 99.5 per cent. of $KHC_4H_4O_6$

Each mil of normal potassium hydroxide V.S. used corresponds to 0.18814 Gm. of $KHC_4H_4O_6$. Each gramme of Potassium Bitartrate, previously dried, corresponds to not less than 5.29 mils of normal potassium hydroxide V.S.

Preparation—Pulvis Jalapæ Compositus.

AVERAGE DOSE—Metric, 2 Gm.—Apothecaries, 30 grains.

POTASSII BROMIDUM

Potassium Bromide

Pot. Brom.

It contains, when dried to constant weight at 100° C., not less than 98.5 per cent. of KBr (119.02). Preserve it in well-closed containers.

Potassium Bromide occurs as colorless, or white, cubical crystals, or as a granular powder; odorless, and having a strongly saline taste. It is permanent in the air.

One Gm. of Potassium Bromide dissolves in 1.5 mils of water, about 250 mils of alcohol, and in 4.6 mils of glycerin at 25° C.; also in 1 mil of boiling water and in about 21 mils of boiling alcohol.

Its aqueous solution (1 in 20) is neutral or faintly alkaline to litmus.

When the salt is heated upon platinum foil it decrepitates; upon further heating it fuses without decomposition and at a bright red heat volatilizes, communicating a violet color to a non-luminous flame.

The addition of 5 mils of sodium bitartrate T.S. to 5 mils of an aqueous solution of the salt (1 in 5) produces a white, crystalline precipitate.

Silver nitrate T.S. added to an aqueous solution of the salt (1 in 10) produces a yellowish-white precipitate, insoluble in nitric acid or in a moderate excess of ammonia water.

Dissolve 1 Gm. of Potassium Bromide in 10 mils of distilled water and add 0.1 mil of tenth-normal sulphuric acid V.S.; no color is produced by the subsequent addition of a drop of phenolphthalein T.S., even after heating (*alkali*).

Add a few drops of ferric chloride T.S. to 10 mils of an aqueous solution of the salt (1 in 20), shake the mixture, and add 1 mil of chloroform; the latter does not acquire a violet tint (*iodide*).

Drop 1 mil of diluted sulphuric acid upon about 1 Gm. of the powdered salt; no yellow color appears at once (*bromate*).

Separate portions of 10 mils each of an aqueous solution of the salt (1 in 20), when acidulated with hydrochloric acid, are not immediately rendered turbid by the addition of 1 mil of potassium sulphate T.S. (*barium*), nor by 1 mil of barium chloride T.S. (*sulphate*).

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

Assay—Dry the salt to constant weight at 100° C. and proceed as directed under the Assay for bromides (see Part II, Test No. 5). It shows, in the dried salt, not less than 98.5 per cent. of KBr.

Each mil of tenth-normal silver nitrate V.S. used corresponds to 0.011902 Gm. of KBr. Each gramme of Potassium Bromide, previously dried, corresponds to not less than 82.8 mils nor more than 84.8 mils of tenth-normal silver nitrate V.S.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

POTASSII CARBONAS

Potassium Carbonate

Pot. Carb.—Salt of Tartar

It contains, when dried to constant weight at 180° C., not less than 99 per cent. of K_2CO_3 (138.20). It contains not more than 15 per cent. of moisture. Preserve it in air-tight containers.

Potassium Carbonate is a white, granular powder; odorless, and having a strongly alkaline taste; very deliquescent.

One Gm. of Potassium Carbonate dissolves in 0.9 mil of water at 25° C.; also in 0.7 mil of boiling water; insoluble in alcohol.

An aqueous solution of Potassium Carbonate (1 in 20) is strongly alkaline to litmus and phenolphthalein T.S., and effervesces with acids.

When heated to 180° C., the salt loses all the water which it may have retained or absorbed; at a bright red heat it melts, and at a white heat it volatilizes, communicating to a non-luminous flame a violet color with not more than a transient yellow tinge.

An aqueous solution of the salt (1 in 10) yields with an excess of tartaric acid T.S. a white crystalline precipitate of potassium bitartrate.

No residue is left on dissolving 1 Gm. of the salt in 20 mils of distilled water (*earthy impurities*).

An aqueous solution of Potassium Carbonate (1 in 50), mixed with a slight excess of hydrochloric acid, does not respond to the Test for heavy metals (see Part II, Test No. 3).

Take about 3 Gm. of Potassium Carbonate, weigh accurately, and dry to constant weight in an air bath at 180° C.; it loses not more than 15 per cent. in weight.

Assay—Dissolve about 3 Gm. of Potassium Carbonate, previously dried to constant weight at 180° C. and accurately weighed in a stoppered weighing-bottle, in 25 mils of distilled water and titrate with normal sulphuric acid V.S., methyl orange T.S. being used as indicator. It shows, in the dried salt, not less than 99 per cent. of K_2CO_3.

Each mil of normal sulphuric acid V.S. used corresponds to 0.06910 Gm. of K_2CO_3. Each gramme of Potassium Carbonate, previously dried, corresponds to not less than 14.33 mils of normal sulphuric acid V.S.

Average dose—Metric, 1 Gm.—Apothecaries, 15 grains.

POTASSII CHLORAS

Potassium Chlorate

Pot. Chloras

It contains not less than 99 per cent. of $KClO_3$ (122.56). Preserve it in well-closed containers. *Great caution should be observed in handling it*, as dangerous explosions are liable to occur when it is heated or subjected to concussion or trituration with organic substances (cork, tannic acid, dust, sugar, etc.), or with sulphur, sulphides, hypophosphites, or other easily oxidizable substances.

Potassium Chlorate occurs in colorless, lustrous, monoclinic prisms or plates, or as a white granular powder; odorless, and having a saline taste. It is permanent in the air.

One Gm. of Potassium Chlorate dissolves in 11.5 mils of water at 25° C.; also in 1.8 mils of boiling water; almost insoluble in alcohol; soluble in glycerin.

An aqueous solution of the salt (1 in 20) is neutral to litmus.

When heated the salt melts, gives off oxygen, and finally leaves a residue of potassium chloride, readily soluble in water and yielding with silver nitrate T.S. a white precipitate, insoluble in nitric acid but readily soluble in ammonia water. To a non-luminous flame it imparts a violet color.

With an excess of tartaric acid T.S. a solution of the salt (1 in 20) slowly yields a scant, white, crystalline precipitate; with platinic chloride T.S., a similar solution yields a yellow crystalline precipitate.

Add about 0.2 Gm. of the salt to 1 mil of hydrochloric acid; the liquid assumes a deep greenish-yellow color, and chlorine and oxides of chlorine are evolved.

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

Assay—Transfer to a 250 mil flask about 0.1 Gm. of Potassium Chlorate, accurately weighed, and dissolve it in 10 mils of distilled water, then add 25 mils of acidulated ferrous sulphate T.S. to the solution. Prepare a valve stopper by taking a piece of rubber tubing of convenient diameter and about 5 cm. in length, placing a piece of glass rod in one end and slipping the other end over a glass tube which passes through a perforated stopper of a size convenient to fit the flask used. Cut a longitudinal slit about 15 mm. long in one side of the rubber tube about half way up. Insert this stopper in the flask and boil the mixture for ten minutes. Now cool the mixture, add 10 mils of manganous sulphate T.S. and titrate the excess of ferrous sulphate with tenth-normal potassium permanganate V.S. At the same time conduct a parallel experiment with another portion of 25 mils of acidulated ferrous sulphate T.S. and subtract the result of the latter titration from that of the former. It shows not less than 99 per cent. of $KClO_3$.

Each mil of tenth-normal potassium permanganate V.S. used corresponds to 0.0020427 Gm. of $KClO_3$. Each gramme of Potassium Chlorate corresponds to not less than 484.7 mils of tenth-normal potassium permanganate V.S.

Preparation—Trochisci Potassii Chloratis.

Average dose—Metric, 0.25 Gm.—Apothecaries, 4 grains.

POTASSII CITRAS

Potassium Citrate

Pot. Cit.

It contains, when dried to constant weight in a desiccator over sulphuric acid, not less than 99 per cent. of $K_3C_6H_5O_7+H_2O$ (324.36). Preserve it in well-closed containers.

Potassium Citrate occurs as transparent, prismatic crystals, or as a white, granular powder; odorless, and having a cooling, saline taste. It is deliquescent when exposed to moist air.

One Gm. of Potassium Citrate dissolves in 0.6 mil of water at 25° C.; almost insoluble in alcohol; freely soluble in glycerin.

An aqueous solution of the salt (1 in 20) is alkaline to litmus but is not reddened by one drop of phenolphthalein T.S.

When heated above 100° C., the salt begins to lose water and at about 200° C. the water of crystallization is completely lost. At a higher temperature the salt begins to decompose, turns brown, and upon further heating carbonizes and emits inflammable gases which have a very pungent, acrid odor. At a red heat a residue remains, which has an alkaline reaction and strongly effervesces with acids.

An aqueous solution of Potassium Citrate (1 in 10) yields a white, crystalline precipitate with sodium bitartrate T.S.

Mix 10 mils of an aqueous solution of the salt (1 in 20) with 10 mils of calcium chloride T.S.; the liquid remains clear until it is boiled, when a white, granular precipitate is produced.

A solution of 1 Gm. of Potassium Citrate in 1 mil of distilled water does not deposit any precipitate on the addition of 1 mil of acetic acid (*tartrate*).

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

An aqueous solution of the salt meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Assay—Dry the salt to constant weight in a desiccator over sulphuric acid, and proceed as directed under the Assay for alkali salts of organic acids (see Part II, Test No. 6). It shows, in the dried salt, not less than 99 per cent. of $K_3C_6H_5O_7+H_2O$.

Each mil of half-normal sulphuric acid V.S. used corresponds to 0.05406 Gm. of $K_3C_6H_5O_7+H_2O$. Each gramme of Potassium Citrate, previously dried, corresponds to 18.3 mils of half-normal sulphuric acid V.S.

Preparation—Potassii Citras Effervescens.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

POTASSII CITRAS EFFERVESCENS

Effervescent Potassium Citrate

Pot. Cit. Eff.

POTASSIUM CITRATE, *two hundred grammes*	200 Gm.
SODIUM BICARBONATE, dried and powdered, *four hundred and seventy-seven grammes*	477 Gm.

TARTARIC ACID, dried and powdered, *two hundred and fifty-two grammes*	252 Gm.
CITRIC ACID, uneffloresced crystals, *one hundred and sixty-two grammes*	162 Gm.
To make about *one thousand grammes*	1000 Gm.

Dry the potassium citrate on a water bath until it ceases to lose weight; after powdering the dried salt, mix it intimately with the powdered citric acid and tartaric acid, then thoroughly incorporate the sodium bicarbonate. Place the mixed powders on a plate of glass or in a suitable dish, in an oven heated between 93° and 104° C. Manipulate the mixture carefully with a wooden spatula, and, when it has become moist, rub it through a No. 6 tinned-iron sieve, and dry the granules at a temperature not exceeding 54° C. Immediately transfer the salt to suitable containers and seal them tightly. Care must be taken to prevent the salt from coming in contact with air containing moisture.

AVERAGE DOSE—Metric, 4 Gm.—Apothecaries, 1 drachm.

POTASSII ET SODII TARTRAS

Potassium and Sodium Tartrate

Pot. et Sod. Tart.—Rochelle Salt

It contains not less than 73.72 per cent. nor more than 77.39 per cent. of anhydrous potassium and sodium tartrate, corresponding to not less than 99 per cent. of the crystallized salt [$KNaC_4H_4O_6 + 4H_2O = 282.20$]. Preserve it in well-closed containers.

Potassium and Sodium Tartrate occurs as colorless, transparent, rhombic prisms, or as a white powder; odorless, and having a cooling, saline taste. The crystals slightly effloresce in dry air.

One Gm. of Potassium and Sodium Tartrate dissolves in 0.9 mil of water at 25° C.; almost insoluble in alcohol.

An aqueous solution of the salt (1 in 20) is alkaline to litmus, but is not reddened by a drop of phenolphthalein T.S.

When heated to about 74° C., the salt fuses to a colorless liquid, which at a higher temperature froths, becomes brown, and gradually carbonizes, while inflammable vapors are emitted, having the odor of burning sugar. Finally, a black residue is left, consisting of potassium and sodium carbonates with carbon. To a non-luminous flame this residue imparts an intensely yellow color.

An aqueous solution of the salt (1 in 10) yields a white, crystalline precipitate with an equal volume of acetic acid.

An aqueous solution of the salt (1 in 10) yields with silver nitrate T.S. a white precipitate which becomes black on boiling.

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

Five mils of an aqueous solution of the salt (1 in 10), when heated with potassium hydroxide T.S., does not evolve *ammonia.*

Dissolve 10 Gm. of Potassium and Sodium Tartrate in 20 mils of distilled water, add 2 mils of sulphurous acid and boil the mixture until the odor of sulphur dioxide is barely perceptible. Cool the solution, mix it with 1 mil of sodium cyanide T.S. and follow this immediately with stronger ammonia water until the precipitate formed is redissolved and the solution has a slight odor of ammonia. When cold, transfer the solution to a glass-stoppered cylinder, graduated to 50 mils, dilute it with sufficient distilled water to measure 50 mils and add 3 drops of sodium sulphide T.S. After mixing well, the color produced in the solution, if any, when viewed downward against a white surface, is not greater than the color of a control solution prepared as follows: Dissolve 2 Gm. of ammonium chloride (see Reagents, Part II) in 20 mils of distilled water, add 4 mils of a solution containing 0.08 Gm. of lead nitrate in 1000 mils of distilled water, and then 1 mil of diluted hydrochloric acid. Treat this solution with the same quantity of hydrochloric acid, sulphurous acid, sodium cyanide T.S. and stronger ammonia water, as used above, transfer it to another 50 mil glass-stoppered cylinder, and then dilute it with sufficient distilled water to make 50 mils and add 3 drops of sodium sulphide T.S. (before adding the sodium sulphide T.S., the liquid must possess a distinct odor of ammonia, and the two cylinders used must be matched, be of practically colorless glass, and have the same internal diameter) (*lead*).

Assay—Proceed as directed under the Assay for alkali salts of organic acids (see Part II, Test No. 6). It shows not less than 73.72 per cent. nor more than 77.39 per cent. of $KNaC_4H_4O_6$.

Each mil of half-normal sulphuric acid V.S. used corresponds to 0.05253 Gm. of $KNaC_4H_4O_6$. Each gramme of Potassium and Sodium Tartrate corresponds to not less than 14.03 mils nor more than 14.73 mils of half-normal sulphuric acid V.S.

Preparation—Pulvis Effervescens Compositus.

AVERAGE DOSE—Metric, 10 Gm.—Apothecaries, 2½ drachms.

POTASSII HYDROXIDUM

Potassium Hydroxide

Pot. Hydrox.—Caustic Potash Potassium Hydrate

It contains not less than 85 per cent. of KOH (56.11). Preserve it in well-closed containers. If bottles are used they must be made of hard glass.

Potassium Hydroxide occurs as dry, white, or nearly white, fused masses, or sticks, hard and brittle, showing a crystalline fracture; odorless. *Great caution is necessary in handling it,* as it rapidly destroys organic tissues. When exposed to the air, it readily absorbs carbon dioxide and moisture, and deliquesces.

One Gm. of Potassium Hydroxide dissolves in 0.9 mil of water, about 3 mils of alcohol, and in 2.5 mils of glycerin at 25° C., also in 0.6 mil of boiling water; very soluble in boiling alcohol.

An aqueous solution of Potassium Hydroxide even when greatly diluted is strongly alkaline to litmus.

When introduced into a non-luminous flame, it imparts to it a violet color.

An aqueous solution of Potassium Hydroxide (1 in 20) is clear and colorless (*organic matter or insoluble impurities*).

An aqueous solution of Potassium Hydroxide (1 in 10), when added to an excess of tartaric acid T.S., produces a white, crystalline precipitate, which redissolves when the Potassium Hydroxide is added in excess.

An aqueous solution of Potassium Hydroxide (1 in 50), slightly acidulated with hydrochloric acid, does not respond to the Test for heavy metals (see Part II, Test No. 3).

Assay—Dissolve in a 500 mil graduated flask about 10 Gm. of Potassium Hydroxide, accurately weighed in a glass-stoppered weighing-bottle, in 250 mils of distilled water, which has previously been boiled and cooled, and add 30 mils of barium chloride T.S. Now fill the flask to the mark with distilled water, which has previously been boiled and cooled, and thoroughly agitate the liquid. Then filter the liquid in the flask through a dry filter into a dry flask, rejecting the first 20 mils, and titrate 200 mils of the clear filtrate with normal hydrochloric acid V.S., using phenolphthalein T.S. as indicator. It shows not less than 85 per cent. of KOH when calculated to the amount originally taken.

Each mil of normal hydrochloric acid V.S. used corresponds to 0.05611 Gm. of KOH. Each gramme of Potassium Hydroxide corresponds to not less than 15.15 mils of normal hydrochloric acid V.S.

Preparation—Liquor Potassii Hydroxidi.

POTASSII HYPOPHOSPHIS

Potassium Hypophosphite

Pot. Hypophos.

It contains, when dried to constant weight in a desiccator over sulphuric acid, not less than 98 per cent. of KPH_2O_2 (104.16). Preserve it in well-closed containers in a dry place. Caution should be observed in dispensing Potassium Hypophosphite, as an explosion is liable to occur when it is triturated or heated with nitrates, chlorates, or other oxidizing agents.

Potassium Hypophosphite occurs as white, opaque, hexagonal plates, or crystalline masses, or as a granular powder; odorless, and having a pungent, saline taste; very deliquescent.

One Gm. of Potassium Hypophosphite dissolves in 0.6 mil of water and in 9 mils of alcohol at 25° C.; also in 0.4 mil of boiling water and in 5 mils of boiling alcohol.

An aqueous solution of the salt (1 in 20) is neutral or slightly alkaline to litmus and yields with sodium bitartrate T.S. a white, crystalline precipitate.

When heated in a dry test tube spontaneously inflammable hydrogen phosphide is evolved which burns with a bright yellow flame.

When an aqueous solution of the salt (1 in 20), acidulated with hydrochloric acid, is added drop by drop with agitation to an excess of mercuric chloride T.S., a white precipitate of mercurous chloride is formed. Upon the further addition of the solution of Potassium Hypophosphite, the precipitate becomes gray from reduction to metallic mercury.

A solution of 1 Gm. of the salt in about 10 mils of distilled water requires not more than 1.5 mils of tenth-normal hydrochloric acid V.S. for neutralization, methyl orange T.S. being used as indicator.

Heat 5 mils of an aqueous solution of the salt (1 in 5) with 0.5 mil of diluted hydrochloric acid in a test tube on a water bath for thirty minutes; no offensive odor is developed.

Measure 5 mils of an aqueous solution of Potassium Hypophosphite (1 in 25) into a beaker containing 3 mils of nitric acid diluted with about 10 mils of distilled water, and evaporate the mixture to dryness on a water bath; the residue meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Add magnesia mixture T.S. to 10 mils of an aqueous solution of the salt (1 in 20) made alkaline with ammonia water; it is not affected within one minute (*phosphates*).

Assay—Dissolve about 1 Gm. of Potassium Hypophosphite, dried to constant weight in a desiccator over sulphuric acid and accurately weighed, in 10 mils of distilled water, add 10 mils of nitric acid and evaporate it to dryness on a water bath. Then add 5 mils of nitric acid and again evaporate it to dryness on a water bath. Dissolve the residue in 20 mils of distilled water, add a drop of phenolphthalein T.S. and sufficient special potassium hydroxide T.S. (see page 545) to produce a pink color, and then dilute it to exactly 100 mils with distilled water. Transfer 10 mils of this solution to a 100 mil graduated flask, add 50 mils of tenth-normal silver nitrate V.S. and proceed from this point as directed in the assay under *Sodii Phosphas* (see page 396). When calculated to the amount originally taken, it shows, in the dried salt, not less than 98 per cent. of KPH_2O_2.

Each mil of tenth-normal silver nitrate V.S. used corresponds to 0.003472 Gm. of KPH_2O_2. Each gramme of Potassium Hypophosphite, previously dried, corresponds to not less than 282.3 mils of tenth-normal silver nitrate V.S.

Preparation—Syrupus Hypophosphitum.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

POTASSII IODIDUM

Potassium Iodide

Pot. Iod.

It contains, when dried to constant weight at 100° C., not less than 99 per cent. of KI (166.02). Preserve it in well-closed containers.

Potassium Iodide occurs as cubical crystals either transparent and colorless or more or less opaque and white, or as a white, granular powder, having a pungent, saline, afterwards bitter taste. Permanent in dry air, and but slightly deliquescent in moist air.

One Gm. of Potassium Iodide dissolves in 0.7 mil of water, 22 mils of alcohol, and in 2 mils of glycerin at 25° C.; also in 0.5 mil of boiling water and in 8 mils of boiling alcohol.

An aqueous solution of the salt (1 in 20) is neutral or slightly alkaline to litmus.

When heated, the salt decrepitates. At a low red heat it fuses, and at a bright red heat it is volatilized without decomposition.

Five mils of an aqueous solution of Potassium Iodide (1 in 20) yields a white, crystalline precipitate with 5 mils of sodium bitartrate T.S.

Add 1 mil of ferric chloride T.S., diluted with an equal volume of distilled water, to 5 mils of an aqueous solution of the salt (1 in 20), and shake the mixture with 5 mils of chloroform; the latter acquires a violet color.

Dissolve 1 Gm. of the salt in 10 mils of distilled water and add 0.1 mil of tenth-normal sulphuric acid V.S.; no color is produced by the subsequent addition of a drop of phenolphthalein T.S. (*alkali*).

Add 2 drops of diluted sulphuric acid (free from sulphurous and nitrous acids) to 0.5 Gm. of the salt dissolved in 10 mils of distilled water, which has previously been boiled and cooled; no distinct yellow color appears within half a minute (*iodate*), and no turbidity occurs (*thiosulphate*).

Acidulate 10 mils of an aqueous solution of the salt (1 in 20) with hydrochloric acid; it is not rendered turbid by the addition of 1 mil of potassium sulphate T.S. (*barium*); another 10 mil portion of an aqueous solution of the salt (1 in 20), acidulated with hydrochloric acid, is not rendered more than slightly turbid by a few drops of barium chloride T.S. (*sulphate*).

Heat gently 5 mils of an aqueous solution of the salt (1 in 10) with one drop of ferrous sulphate T.S. and 0.5 mil of potassium hydroxide T.S.; no blue color appears after acidulating the mixture with hydrochloric acid (*cyanide*).

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

Assay—Dry the salt to constant weight and proceed as directed under the Assay for iodides (see Part II, Test No. 5). It shows, in the dried salt, not less than 99 per cent. of KI.

Each mil of tenth-normal silver nitrate V.S. used corresponds to 0.016602 Gm. of KI. Each gramme of Potassium Iodide, previously dried, corresponds to not less than 59.6 mils nor more than 61.0 mils of tenth-normal silver nitrate V.S.

Preparations—Liquor Iodi Compositus Tinctura Iodi Unguentum Iodi.

AVERAGE DOSE—Metric, 0.3 Gm.—Apothecaries, 5 grains.

POTASSII NITRAS

Potassium Nitrate

Pot. Nit.—Saltpetre

It contains, when dried to constant weight at 100° C., not less than 99 per cent. of KNO_3 (101.11). Preserve it in well-closed containers.

Potassium Nitrate occurs as colorless, transparent, six-sided rhombic prisms, or a white, crystalline powder; odorless, having a saline taste and producing a cooling sensation in the mouth. Slightly hygroscopic in moist air.

One Gm. of Potassium Nitrate dissolves in 2.8 mils of water and in 620 mils of alcohol at 25° C.; also in 0.5 mil of boiling water; soluble in glycerin.

Its aqueous solution (1 in 10) is neutral to litmus.

When strongly heated, the salt melts without decomposition. At higher temperatures it evolves oxygen and is partly reduced to nitrite. When Potassium Nitrate is heated with charcoal, the mixture deflagrates.

With sodium bitartrate T.S. an aqueous solution of the salt (1 in 20) yields a white crystalline precipitate.

Mix an aqueous solution of Potassium Nitrate (1 in 10) in a test tube with a drop of diphenylamine T.S. and slowly add sulphuric acid so as to form a separate layer; a deep blue color appears at the line of contact.

An aqueous solution of Potassium Nitrate does not respond to the Test for heavy metals (see Part II, Test No. 3).

No yellow color appears when 0.1 Gm. of the dry salt is sprinkled upon 1 mil of concentrated sulphuric acid (*chlorate or perchlorate*).

Assay—Dissolve about 0.4 Gm. of Potassium Nitrate, previously dried to constant weight at 100° C. and accurately weighed, in 10 mils of hydrochloric acid in a small dish, and evaporate the solution to dryness on a water bath. Dissolve the residue in 10 mils of hydrochloric acid and again evaporate it to dryness on a water bath, continuing the heat until the residue, when redissolved in distilled water, is neutral to litmus. Transfer the residue with the aid of 25 mils of distilled water to a flask and proceed as directed under the Assay for chlorides (see Part II, Test No. 5), deducting from the amount of tenth-normal silver nitrate V.S. consumed, the amount which would be consumed by the chlorides present in an equivalent weight of the salt originally taken, and previously estimated by taking about 1 Gm. of the salt, accurately weighed, and proceeding as directed under the Assay for chlorides (see Part II, Test No. 5). It shows, in the dried salt, not less than 99 per cent. of KNO_3.

Each mil of tenth-normal silver nitrate V.S. used corresponds to 0.010111 Gm. of KNO_3. Each gramme of Potassium Nitrate, previously dried, corresponds to not less than 97.9 mils of tenth-normal silver nitrate V.S.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

POTASSII PERMANGANAS

Potassium Permanganate

Pot. Permang.

It contains, when dried to constant weight in a desiccator over sulphuric acid, not less than 99 per cent. of $KMnO_4$ (158.03). Preserve it in glass-stoppered bottles. Potassium Permanganate when in solution or in the dry condition must not be brought into contact with organic or other readily oxidizable substances.

Potassium Permanganate occurs as slender, monoclinic prisms, of a dark purple color, almost opaque by transmitted light, and of a blue, metallic luster by reflected light; odorless, and having (in solution) a taste at first sweet, but afterwards disagreeable and astringent. Permanent in the air.

One Gm. of Potassium Permanganate dissolves in 13.5 mils of water at 25° C.; also in 3.5 mils of boiling water; it is decomposed by alcohol.

When heated, the salt decrepitates, and at about 240° C. it decomposes, yielding oxygen, potassium manganate, and manganese dioxide.

An aqueous solution of the salt is of a deep violet-red color when concentrated, and of a rose color when highly diluted. The color is discharged by hydrogen sulphide, ferrous sulphate, oxalic acid, alcohol, and many other substances, especially if the solution is first rendered acid by sulphuric acid.

Assay—Dissolve about 0.15 Gm. of Potassium Permanganate, previously dried to constant weight in a desiccator over sulphuric acid and accurately weighed, in 25 mils of distilled water, mix the solution with 1 mil of sulphuric acid and 50 mils of tenth-normal oxalic acid V.S. and warm the mixture to about 80° C. The residual titration with tenth-normal potassium permanganate V.S. shows, in the dried salt, not less than 99 per cent. of $KMnO_4$.

Each mil of tenth-normal oxalic acid V.S. used corresponds to 0.0031606 Gm. of $KMnO_4$. Each gramme of Potassium Permanganate, previously dried, corresponds to not less than 313.2 mils of tenth-normal oxalic acid V.S.

AVERAGE DOSE—Metric, 0.06 Gm.—Apothecaries, 1 grain.

PRUNUS VIRGINIANA

Wild Cherry

Prun. Virg.—Wild Black Cherry Bark

The stem-bark of *Prunus serotina* Ehrhart (*Prunus virginiana* Miller) (Fam. *Rosaceæ*), collected in autumn and carefully dried. Preserve Wild Cherry in tightly-closed containers, protected from light.

Usually in transversely curved pieces from 2.5 to 8 cm. in length and from 0.5 to 4 mm. in thickness; outer surfaces light brown or greenish-brown, smooth, except for numerous lenticels from 3 to 4 mm. in length; inner surfaces light brown, longitudinally striate and occasionally fissured; fracture short, granular; odor distinct, bitter almond-like when macerated in water; taste astringent, aromatic, and agreeably bitter.

Under the microscope, sections of Wild Cherry show a tendency for the separation in radial segments or bands of the phloem tissues from the rather broad medullary rays; periderm usually of a few layers of cells; outer bark from young twigs with 1 or 2 nearly continuous layers of cells, the latter being of very irregular shape, often branching and with thick lamellated, porous walls; medullary rays extending in more or less scythe-shaped groups from the cambium to the outer bark, from 1 to 10 cells in width, some of the cells occasionally being modified to stone cells; between the medullary rays occur numerous small groups of stone cells, resembling those of the outer bark and occasionally modified to sclerenchymatous fibers; calcium oxalate mostly in crystal fibers consisting of monoclinic prisms, from 0.015 to 0.04 mm. in diameter, also in rosette aggregates from 0.01 to 0.04 mm. in diameter; starch grains numerous, occurring in the medullary rays and parenchyma.

The powder is light brown; when examined under the microscope it exhibits bast-fibers and stone cells with thick, strongly lignified walls; crystal fibers with monoclinic prisms and rosette aggregates of calcium oxalate, from 0.01 to 0.04 mm. in diameter; starch grains nearly spherical, from 0.003 to 0.004 mm. in diameter.

Preparation—Syrupus Pruni Virginianæ.

AVERAGE DOSE—Metric, 2 Gm.—Apothecaries, 30 grains.

PULVIS AROMATICUS

Aromatic Powder

Pulv. Arom.

SAIGON CINNAMON, in No. 60 powder, *thirty-five grammes*.	35 Gm.
JAMAICA GINGER, in No. 60 powder, *thirty-five grammes*...	35 Gm.
CARDAMOM SEED (deprived of pericarps), *fifteen grammes*.	15 Gm.
MYRISTICA, freshly grated, *fifteen grammes*.............	15 Gm.
To make *one hundred grammes*...........	100 Gm.

Triturate the cardamom seed and the myristica with a portion of the saigon cinnamon until they are reduced to a fine powder; then add the remainder of the cinnamon and the ginger and rub them together until they are thoroughly mixed.

Light reddish-brown; with a strong, distinctive, aromatic odor; when examined under the microscope it exhibits characteristic starch grains of ginger, being ellipsoidal or ovoid, slightly beaked and from 0.005 to 0.06 mm. in diameter; numerous yellowish-brown, brownish-red and occasional blackish fragments, the cellular structure of which is not distinct; occasional stone cells, the lumina being filled usually with a reddish-brown amorphous substance or containing air; occasional fragments with sclerenchymatous fibers; calcium oxalate crystals, in short raphides, few.

Preparation—Fluidextractum Aromaticum.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

PULVIS CRETÆ COMPOSITUS

Compound Chalk Powder

Pulv. Cret. Co.

Prepared Chalk, *thirty grammes*	30 Gm.
Acacia, in fine powder, *twenty grammes*	20 Gm.
Sugar, in fine powder, *fifty grammes*	50 Gm.
To make *one hundred grammes*	100 Gm.

Mix the powders intimately by trituration and pass the product through a No. 60 sieve.

Preparation—Mistura Cretæ.

Average dose—Metric, 2 Gm.—Apothecaries, 30 grains.

PULVIS EFFERVESCENS COMPOSITUS

Compound Effervescing Powder

Pulv. Eff. Co.—Seidlitz Powder

The weight of the mixture in a blue paper is not less than 9.5 Gm. nor more than 10.5 Gm.; it contains not less than 23 per cent. nor more than 27 per cent. of sodium bicarbonate and not less than 73 per cent. nor more than 78 per cent. of potassium and sodium tartrate.

Sodium Bicarbonate, dried and in fine powder, *thirty grammes*	30 Gm.
Potassium and Sodium Tartrate, dried and in fine powder, *ninety grammes*	90 Gm.
Tartaric Acid, dried and in fine powder, *twenty-six grammes*	26 Gm.

Mix the sodium bicarbonate intimately with the potassium and sodium tartrate, divide the mixture into *twelve equal parts*, and wrap each part in a separate blue paper.

Then divide the tartaric acid into *twelve equal parts*, and wrap each part in a separate white paper.

Keep the powders in well-closed containers, in a dry place.

To 5 mils of an aqueous solution of the mixture in a blue paper (1 in 20) add 5 mils of acetic acid, and when effervescence has ceased, shake the solution vigorously; a white crystalline precipitate, soluble in ammonia water, separates.

Assay for **sodium bicarbonate**—Mix thoroughly the contents of a blue paper, then dissolve 2 Gm. of it in 80 mils of distilled water, add 20 mils of half-normal sulphuric acid V.S., boil the solution until the volume is reduced to about 50 mils, and titrate the excess of acid with half-normal potassium hydroxide V.S., phenolphthalein T.S. being used as indicator. The number of mils of half-normal sulphuric acid V.S. consumed shows not less than 23 per cent. nor more than 27 per cent. of sodium bicarbonate.

Each mil of half-normal sulphuric acid V.S. corresponds to 0.04200 Gm. of sodium bicarbonate. Each gramme of the mixture corresponds to not less than 5.48 mils nor more than 6.43 mils of half-normal sulphuric acid V.S.

Assay for potassium and sodium tartrate—Proceed as directed under the assay for alkali salts of organic acids (see Part II, Test No. 6), using 2 Gm. of the mixture taken from the blue paper used in the preceding assay. The difference between the number of mils of half-normal sulphuric acid V.S. consumed in this assay and in the assay for sodium bicarbonate, multiplied by 0.07055, represents the potassium and sodium tartrate, and corresponds to not less than 73 per cent. nor more than 78 per cent.

The sum of the percentages of sodium bicarbonate and of the potassium and sodium tartrate is not less than 99 per cent.

AVERAGE DOSE—1 set of two powders.

PULVIS GLYCYRRHIZÆ COMPOSITUS

Compound Powder of Glycyrrhiza

Pulv. Glycyrrh. Co.—Compound Licorice Powder

SENNA, in No. 80 powder, *one hundred and eighty grammes*	180 Gm.
GLYCYRRHIZA, in No. 80 powder, *two hundred and thirty-six grammes*	236 Gm.
WASHED SULPHUR, *eighty grammes*	80 Gm.
OIL OF FENNEL, *four grammes*	4 Gm.
SUGAR, in fine powder, *five hundred grammes*	500 Gm.
To make *one thousand grammes*	1000 Gm.

Mix the oil of fennel thoroughly with about one-half of the sugar, then add the remainder of the sugar and the other ingredients, and mix thoroughly. Finally, pass the powder through a No. 80 sieve, pulverize the residue if any should be left on the sieve, add it to the sifted powder, and mix thoroughly. Keep it in well-closed containers.

Greenish-yellow to greenish-brown with a fennel-like odor; when mounted in water or hydrated chloral T.S. and examined under the microscope, Compound Powder of Glycyrrhiza shows fragments of glycyrrhiza with their characteristic yellow fibers associated with crystal fibers, large tracheæ with elliptical, bordered pores and cells containing numerous, spherical starch grains varying from 0.002 to 0.02 mm. in diameter, also fragments of senna as shown by their characteristic, more or less bent, unicellular, non-glandular hairs, from 0.1 to 0.35 mm. in length; fragments of epidermis with elliptical stomata and their 2 neighboring cells and fragments with crystal fibers; upon the addition of potassium hydroxide T.S. to aqueous mounts of the powder, some of the fragments are immediately colored a yellowish-red, changing to a reddish-brown.

Introduce 0.1 Gm. of Compound Powder of Glycyrrhiza into a test tube, moisten it with 2 mils of alcohol, then add 10 mils of water, boil the mixture, allow it to cool and then filter; the filtrate is of a pale yellowish-brown color, which changes immediately to a yellowish-red on the addition of a drop of potassium hydroxide T.S.

Compound Powder of Glycyrrhiza is free from an odor of hydrogen sulphide.

AVERAGE DOSE—Metric, 4 Gm.—Apothecaries, 1 drachm.

PULVIS IPECACUANHÆ ET OPII

Powder of Ipecac and Opium

Pulv. Ipecac. et Opii—Compound Powder of Ipecac Dover's Powder
Opii et Ipecacuanhæ pulvis compositus P.I.

IPECAC, in No. 60 powder, *ten grammes*	10 Gm.
POWDERED OPIUM, *ten grammes*	10 Gm.
SUGAR OF MILK, in No. 30 powder, *eighty grammes*	80 Gm.
To make *one hundred grammes*	100 Gm.

Triturate these together thoroughly until the mixture is reduced to a very fine, uniform powder.

Grayish-white or very light brown; under the microscope it exhibits coarse, angular, frequently more or less cone-shaped, colorless fragments from 0.03 to 0.4 mm. in length, very slowly soluble in water and hydrated chloral T.S. and strongly polarizing light with a strong display of colors (fragments of *sugar of milk*); numerous starch grains of ipecac, their presence confirmed by the addition of iodine T.S., and varying from 0.003 to 0.017 mm. in diameter; occasional fragments of tracheids of ipecac; and occasional fragments with the more or less tabular, characteristic stone cells of the capsules of the opium poppy, with their light brown, porous and strongly lignified walls.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

PULVIS JALAPÆ COMPOSITUS

Compound Powder of Jalap

Pulv. Jalap. Co.—Pulvis Purgans

JALAP, in No. 60 powder, *thirty-five grammes*	35 Gm.
POTASSIUM BITARTRATE, in fine powder, *sixty-five grammes*	65 Gm.
To make *one hundred grammes*	100 Gm.

Mix the powders intimately by trituration and pass the product through a No. 60 sieve.

Very light brown; when examined under a microscope it exhibits numerous, sharp-angular, colorless fragments mostly somewhat rectangular and with straight edges varying from 0.03 to 0.3 mm. in length, slowly soluble in water or hydrated chloral T.S. and strongly polarizing light with a strong display of colors (fragments of crystals of *potassium bitartrate*); numerous starch grains of jalap, readily distinguished without the use of iodine T.S., usually single, occasionally 2- to 3-compound, and varying from 0.003 to 0.035 mm. in diameter; occasional fragments of laticiferous vessels and parenchyma with yellowish-brown walls, or tracheæ with bordered pores, and rosette aggregates of calcium oxalate from 0.01 to 0.035 mm. in diameter, that occur in jalap.

AVERAGE DOSE—Metric, 2 Gm.—Apothecaries, 30 grains.

PULVIS RHEI COMPOSITUS

Compound Powder of Rhubarb

Pulv. Rhei Co.—Gregory's Powder

RHUBARB, in No. 60 powder, *twenty-five grammes*	25 Gm.
MAGNESIUM OXIDE, *sixty-five grammes*	65 Gm.
JAMAICA GINGER, in No. 60 powder, *ten grammes*	10 Gm.
To make *one hundred grammes*	100 Gm.

Rub the rhubarb and ginger together, then gradually add the magnesium oxide and continue the trituration until they are thoroughly mixed, then pass through a No. 60 sieve.

A pinkish-white, mobile powder, becoming darker on exposure to moisture; when examined under the microscope it exhibits fine particles of magnesium oxide, numerous starch grains and characteristic fragments of vegetable tissues; starch grains of ginger, more or less elliptical or ovoid, frequently with a prominent beak, from 0.005 to 0.06 mm. in diameter; starch grains of rhubarb, single or compound, either spherical or polygonal, often with a central cleft, from 0.002 to 0.02 mm. in diameter; mounts made with hydrated chloral T.S. give a strong effervescence and show more clearly the fragments of reticulate tracheæ, the reddish-brown parenchyma of rhubarb with numerous small starch grains or rosette aggregates of calcium oxalate, varying from 0.05 to 0.1 mm. in diameter. With solutions of the alkalies many of the fragments of rhubarb become of a deep red color.

AVERAGE DOSE—Metric, 2 Gm.—Apothecaries, 30 grains.

PYRETHRUM

Pyrethrum

Pyreth.—Pellitory Root

The dried root of *Anacyclus Pyrethrum* (Linné) De Candolle (Fam. *Compositæ*). Preserve Pyrethrum in tightly-closed containers, adding a few drops of chloroform or carbon tetrachloride, from time to time, to prevent attack by insects.

Nearly cylindrical, slightly tapering, usually in pieces from 2.5 to 10 cm. in length and from 5 to 20 mm. in diameter; externally dark brown, deeply longitudinally furrowed and somewhat wrinkled, occasionally bearing short, tough, hair-like rootlets, crown more or less annulate, and occasionally tufted with coarse fibers or with long, soft-woolly, nearly straight, 1-celled hairs; fracture short; bark dark brown with 1 or 2 circular rows of resin ducts, closely adhering to the light yellow, radiate, porous wood, in the medullary rays of which occur 1 to 3 rows of resin ducts; odor distinct; taste sweetish, pungent, very acrid, tingling and producing a strong sialogogue effect.

The powder is light to dark brown; when examined under the microscope it exhibits numerous spherical or irregular masses of inulin, the nature of which is especially seen with polarized light, and lignified fragments of the woody tissues and stone cells associated with cork; inulin in spherical granules or irregular masses, from 0.01 to 0.1 mm. in diameter, which is not affected by the addition of iodine T.S.; tracheæ with simple pores and reticulate or scalariform thickenings, usually associated with wood parenchyma and with few or no wood fibers; stone cells in groups, the cells more or less tabular in outline and with thick, yellowish porous walls; cork in yellowish-brown or dark brown fragments.

Pyrethrum yields not more than 5 per cent. of ash.

Preparation—Tinctura Pyrethri.

AVERAGE DOSE—Metric, 2 Gm.—Apothecaries, 30 grains.

PYROGALLOL

Pyrogallol

Pyrogall.—Pyrogallic Acid

Trihydroxybenzene [$C_6H_3(OH)_3$ 1 : 2 : 3 =126.05]. Preserve it in well-closed containers, protected from light.

Pyrogallol occurs in light, white, or nearly white laminæ or fine needles; odorless, and having a bitter taste. It acquires a grayish tint on exposure to air and light.

One Gm. of Pyrogallol dissolves in 1.7 mils of water, 1.3 mils of alcohol, and in 1.6 mils of ether at 25° C.; very soluble in boiling water or boiling alcohol.

It melts between 129° and 133° C.

An aqueous solution of Pyrogallol (1 in 10) reduces solutions of the salts of silver, gold, and mercury even in the cold.

When freshly prepared, 1 mil of an aqueous solution of Pyrogallol (1 in 20) is colored brownish-red by a few drops of ferric chloride T.S. A blue color is produced in an aqueous solution of Pyrogallol (1 in 20) by freshly prepared ferrous sulphate T.S.

Incinerate about 1 Gm. of Pyrogallol; not more than 0.1 per cent. of ash remains.

A freshly prepared solution of Pyrogallol (1 in 20), in recently boiled distilled water, is colorless or at most slightly yellow, and is neutral or only slightly acid to litmus. The solution gradually acquires a brown color on exposure to the air and an acid reaction due to the absorption of oxygen; the absorption of oxygen and change of color take place very rapidly if the solution contains an alkali hydroxide.

PYROXYLINUM

Pyroxylin

Pyroxylin.—Soluble Gun Cotton

A product obtained by the action of a mixture of nitric and sulphuric acids on cotton and consisting chiefly of cellulose tetranitrate [$C_{12}H_{16}(ONO_2)_4O_6=504.17$]. Preserve it in cartons, packed loosely, and protected from light and moisture.

Pyroxylin is a yellowish-white, matted mass of filaments, resembling raw cotton in appearance, harsh to the touch; exceedingly inflammable, burning, when unconfined, very rapidly and with a luminous flame; less explosive than cellulose hexanitrate.

When kept in well-closed bottles and exposed to the light, it is decomposed with the evolution of nitrous vapors, leaving a carbonaceous residue.

It is slowly but completely soluble in 25 parts of a mixture of 3 volumes of ether and 1 volume of alcohol. Soluble in acetone and in glacial acetic acid and precipitated from these solutions on the addition of water.

Saturate 0.5 Gm. of Pyroxylin with alcohol in a dish placed in cold water and then ignite the Pyroxylin at the top. When combustion is completed and the dish heated to redness, not more than 0.3 per cent. of ash remains.

Stir 1 Gm. of Pyroxylin with 20 mils of distilled water; the latter does not acquire an acid reaction, and on evaporating 10 mils of the filtered liquid to dryness on a water bath, not more than 0.0015 Gm. of residue remains (*soluble impurities*).

Preparation—Collodium.

QUASSIA

Quassia

Quass.—Bitter Wood

The wood of *Picrasma excelsa* (Swartz) Planchon, known in commerce as Jamaica Quassia, or of *Quassia amara* Linné, known in commerce as Surinam Quassia (Fam. *Simarubaceæ*).

Jamaica Quassia—Usually in chips, raspings or shavings, occasionally in small cubes or billets; yellowish-white or bright yellow, with a few light gray pieces somewhat coarsely grained; fracture tough, fibrous; odor slight; taste bitter.

Under the microscope, sections of Jamaica Quassia show large tracheæ either single or in groups of 2 to 5, the walls being marked by numerous, small, bordered pores, and the contents being often of a yellowish color; medullary rays mostly 1 to 5 cells wide and from 10 to 20 rows deep; calcium oxalate, in crystal fibers near the medullary rays, in 4- to 6-sided prisms, from 0.006 to 0.03 mm. in length; wood fibers with thin walls and oblique pores; starch grains few, spherical or ellipsoidal, from 0.01 to 0.015 mm. in diameter.

Surinam Quassia—The crude drug and microscopic sections closely resemble the Jamaica variety; tracheæ usually single or in pairs, sometimes in groups of 3 or 4; medullary rays in narrower and larger groups than in the Jamaica variety, from 1 to 4 cells wide and from 10 to 30 rows deep; calcium oxalate crystals few or entirely absent, thus distinguishing the variety from Jamaica Quassia.

Preparation—Tinctura Quassiæ.

AVERAGE DOSE—Metric, 0.5 Gm.—Apothecaries, 8 grains.

QUININA

Quinine

Quin.

An alkaloid [$C_{20}H_{24}O_2N_2+3H_2O=378.26$] obtained from the bark of various species of *Cinchona* (Fam. *Rubiaceæ*). Preserve it in well-closed containers, protected from light.

Quinine occurs as a white, micro-crystalline powder; odorless, having a bitter taste, developing rather slowly, but intense and persistent; efflorescent in dry air.

One Gm. of Quinine dissolves in 1560 mils of water, 0.8 mil of alcohol, 1.1 mils of chloroform, 1.9 mils of ether, and in 1890 mils of ammonia water at 25° C.; also in 800 mils of boiling water.

Its alcoholic solution (1 in 10) is lævorotatory and alkaline to litmus.

A solution of Quinine in diluted sulphuric acid shows a vivid blue fluorescence.

Add 2 or 3 drops of bromine T.S. to 1 mil of an aqueous solution of Quinine (1 in 100) made with the aid of just sufficient diluted sulphuric acid to effect solution, and then add 1 mil of ammonia water; the liquid acquires an emerald-green color due to the formation of thalleioquin.

Quinine loses not more than 15 per cent. of its weight when dried to constant weight at 100° C.

Incinerate about 1 Gm. of Quinine; not more than 0.1 per cent. of ash remains.

A solution of about 0.1 Gm. of Quinine in 2 mils of sulphuric acid is not darker than light yellow (*organic impurities*). This solution is not colored red on the subsequent addition of a few drops of nitric acid (*morphine*).

Heat about 0.2 Gm. of Quinine with 2 mils of potassium hydroxide T.S.; the odor of ammonia is not evolved (*ammonium salts*).

Dissolve 1.74 Gm. of Quinine in 20 mils of alcohol, dilute the solution with 50 mils of hot distilled water and neutralize it with normal sulphuric acid V.S., using methyl red T.S. as indicator. Evaporate the liquid to dryness on a water bath, powder the residue, mix it in a test tube with 20 mils of distilled water and complete the test for other cinchona alkaloids as directed under *Quininæ Sulphas.*

Metric Apothecaries
AVERAGE DOSE—Tonic, 0.1 Gm.— 1½ grains.
Anti-malarial, at least 1 Gm.—15 grains daily.

QUININÆ BISULPHAS

Quinine Bisulphate

Quin. Bisulph.

The acid sulphate $[C_{20}H_{24}O_2N_2.H_2SO_4+7H_2O=548.41]$ of the alkaloid quinine. Preserve it in well-closed containers, protected from light.

Quinine Bisulphate occurs in colorless, transparent, or whitish, orthorhombic crystals or small needles; odorless, and having a very bitter taste. It effloresces on exposure to air, and turns yellow on exposure to light.

One Gm. of Quinine Bisulphate dissolves in 9 mils of water, 23 mils of alcohol, 15 mils of glycerin, 625 mils of chloroform and in 2500 mils of ether, at 25° C.; also in 0.7 mil of boiling water and 0.7 mil of alcohol at 60° C.

Its aqueous solution (1 in 20) is strongly acid to litmus and has a blue fluorescence.

Add 1 or 2 drops of bromine T.S. to 1 mil of an aqueous solution of Quinine Bisulphate (1 in 100) and then add 1 mil of ammonia water; the liquid acquires an emerald-green color due to the formation of thalleioquin.

Barium chloride T.S. added to an aqueous solution of the salt produces a white precipitate, insoluble in hydrochloric acid.

Quinine Bisulphate loses not more than 25 per cent. of its weight when dried to constant weight at 100° C.

Incinerate about 2 Gm. of Quinine Bisulphate; not more than 0.05 per cent. of ash remains.

A solution of about 0.1 Gm. of the salt in 2 mils of sulphuric acid is not darker than light yellow (*organic impurities*). This solution is not colored red by the subsequent addition of a few drops of nitric acid (*morphine*).

Dissolve 2.52 Gm. of Quinine Bisulphate in 50 mils of hot distilled water and neutralize the solution with normal sodium hydroxide V.S., using methyl red T.S. as indicator. Evaporate the solution to dryness on a water bath, powder the residue, mix it in a test tube with 20 mils of distilled water and complete the test for other cinchona alkaloids as directed under *Quininæ Sulphas*

Metric Apothecaries
AVERAGE DOSE—Tonic, 0.1 Gm.— 1½ grains.
Anti-malarial, at least 1 Gm.—15 grains daily.

QUININÆ DIHYDROCHLORIDUM

Quinine Dihydrochloride

Quin. Dihydrochl.

The dihydrochloride [$C_{20}H_{24}O_2N_2.2HCl = 397.15$] of the alkaloid quinine. Preserve it in well-closed containers, protected from light.

It occurs as a white powder, odorless, and having a very bitter taste.

One Gm. of Quinine Dihydrochloride dissolves in about 0.6 mil of water and in 12 mils of alcohol at 25° C.; it is slightly soluble in chloroform and very slightly soluble in ether.

Its aqueous solution (1 in 20) is strongly acid to litmus.

Silver nitrate T.S. added to an aqueous solution of the salt (1 in 20) produces a white precipitate, insoluble in nitric acid.

Add 1 or 2 drops of bromine water T.S. to 1 mil of an aqueous solution of the salt (1 in 100) and then add an excess of ammonia water; an emerald-green color is produced due to the formation of thalleioquin.

Incinerate about 2 Gm. of Quinine Dihydrochloride; not more than 0.05 per cent. of ash remains.

A solution of about 0.1 Gm. of the salt in 2 mils of sulphuric acid is not darker than yellow (*readily carbonizable impurities*).

Ten mils of an aqueous solution of the salt (1 in 50) is not rendered more than faintly turbid by the addition of a few drops of barium chloride T.S. (*sulphate*).

The addition of a few drops of diluted sulphuric acid to 10 mils of an aqueous solution of the salt (1 in 20) produces no turbidity (*barium*).

Dissolve 1.8 Gm. of Quinine Dihydrochloride in 10 mils of distilled water, add a slight excess of ammonia water and extract the precipitate by shaking the mixture with three successive portions of 20, 10 and 10 mils each of chloroform. Evaporate the combined chloroform extracts to dryness on a water bath, dissolve the residue in 25 mils of alcohol, dilute it with 50 mils of hot distilled water and neutralize the liquid with normal sulphuric acid V.S., using methyl red T.S. as indicator. Now evaporate the liquid to dryness on a water bath, powder the residue, mix it with 20 mils of distilled water in a test tube, and complete the test for other cinchona alkaloids as directed under *Quininæ Sulphas*.

	Metric	Apothecaries
AVERAGE DOSE—Tonic,	0.1 Gm.—	1½ grains.
Anti-malarial, at least	1 Gm.—	15 grains daily.

QUININÆ ET UREÆ HYDROCHLORIDUM

Quinine and Urea Hydrochloride

Quin. et Urea. Hydrochl.—Quinine and Urea Chloride

A compound of the hydrochlorides of quinine and urea [$C_{20}H_{24}O_2N_2.HCl.CO(NH_2)_2.HCl + 5H_2O = 547.28$] which contains not less than 58 per cent. of anhydrous quinine. Preserve it in well-closed containers, protected from light.

Quinine and Urea Hydrochloride occurs in colorless, translucent prisms or as a white, granular powder; odorless, and having a very bitter taste; permanent in the air.

One Gm. of Quinine and Urea Hydrochloride dissolves in 0.9 mil of water and in 2.4 mils of alcohol at 25° C.

An aqueous solution of the salt (1 in 20) is strongly acid to litmus.

Silver nitrate T.S. added to an aqueous solution of the salt produces a white precipitate, insoluble in nitric acid.

Add 2 mils of colorless nitric acid to a cold solution of about 1 Gm. of the salt in 2 mils of distilled water and cool the mixture at once at the temperature of melting ice. Crystalline leaflets of urea nitrate are formed on standing. Collect the crystals in a funnel upon glass wool, wash them with about 5 mils of a cold mixture of equal volumes of nitric acid and distilled water, and, after draining them, dissolve the crystals in a few mils of distilled water. The addition of a few drops of mercuric nitrate T.S. to the urea nitrate solution, followed by sodium hydroxide T.S., to only a slightly acid reaction, produces a white precipitate.

Incinerate about 2 Gm. of Quinine and Urea Hydrochloride; not more than 0.05 per cent. of ash remains.

A solution of about 0.1 Gm. of the salt in 2 mils of sulphuric acid is not darker than light yellow (*readily carbonizable matter*).

Warm 10 mils of an aqueous solution of the salt (1 in 20) with 5 mils of sodium hydroxide T.S. to 50° C.; the odor of ammonia is not evolved at once (*ammonium compounds*).

The quinine obtained by precipitating 60 mils of an aqueous solution of the salt (1 in 20) with sodium hydroxide T.S., washing it on a filter with cold distilled water until the washings give only a faint opalescence with silver nitrate T.S., and then drying it at about 50° C., responds to the test for identity, and 1.5 Gm. of it conforms to the requirement regarding other cinchona alkaloids under *Quinina*.

Assay—Weigh accurately about 0.5 Gm. of Quinine and Urea Hydrochloride, dissolve it in 5 mils of distilled water in a separator, then add 5 mils of potassium hydroxide T.S., and shake the mixture with successive portions of 10, 5 and 5 mils, respectively, of ether or sufficient to completely extract the quinine. Upon evaporation of the combined ether-extracts and drying to constant weight at 100° C., the residue of anhydrous quinine corresponds to not less than 58 per cent. of the weight of the salt taken.

AVERAGE DOSE—Hypodermic (one dose daily), Metric, 1 Gm.—Apothecaries, 15 grains.

QUININÆ HYDROBROMIDUM

Quinine Hydrobromide

Quin. Hydrobr.—Quinine Bromide

The hydrobromide [$C_{20}H_{24}O_2N_2.HBr+H_2O=423.16$] of the alkaloid quinine. Preserve it in well-closed containers, protected from light.

Quinine Hydrobromide occurs in white, light, silky needles; odorless, and having a very bitter taste. The salt effloresces on exposure to the air.

One Gm. of Quinine Hydrobromide dissolves in 40 mils of water, 0.9 mil of alcohol, 7 mils of glycerin, 0.6 mil of chloroform, and in 23 mils of ether at 25° C.; also in 3.2 mils of water at 80° C.

Its saturated aqueous solution is neutral or not more than slightly alkaline to litmus, and when strongly acidulated with diluted sulphuric acid has a vivid blue fluorescence.

Precipitate a saturated aqueous solution of the salt with sodium hydroxide T.S.; filter, supersaturate the filtrate with acetic acid, and then add chloroform and a little chlorine water, and shake the mixture; the chloroform assumes a reddish-brown color.

Add 1 or 2 drops of bromine T.S. to 1 mil of an aqueous solution of Quinine Hydrobromide (1 in 100) and then add 1 mil of ammonia water; the liquid acquires an emerald-green color due to the formation of thalleioquin.

Quinine Hydrobromide loses not more than 5 per cent. of its weight when dried to constant weight at 100° C.

Incinerate about 2 Gm. of Quinine Hydrobromide; not more than 0.05 per cent. of ash remains.

A solution of about 0.1 Gm. of the salt in 2 mils of sulphuric acid is not darker than light yellow (*organic impurities*). On the addition of 0.1 mil of nitric acid to this solution an orange color is produced, due to the liberation of bromine, but no deep color, fading to orange, is noticeable (*morphine*).

Ten mils of an aqueous solution of the salt (1 in 50), acidulated with hydrochloric acid, is not rendered more than faintly turbid by a few drops of barium chloride T.S. (*sulphate*).

The addition of a few drops of diluted sulphuric acid to 10 mils of a hot aqueous solution of the salt (1 in 20) produces no turbidity (*barium*).

Dissolve 2.93 Gm. of Quinine Hydrobromide in 20 mils of distilled water at 65° C., in a test tube of about 80 mils capacity, add a solution of 1.5 Gm. of crystallized sodium sulphate in 10 mils of distilled water warmed to 65° C. and maintain the mixture at this temperature for half an hour, shaking it frequently and thoroughly in the stoppered tube. Then cool it to 15° C. and keep it at this temperature for two hours, shaking it occasionally. Now filter the liquid through a filter paper of 8 to 10 cm. diameter and complete the test for other cinchona alkaloids with 5 mils of the filtrate as directed under *Quininæ Sulphas.*

	Metric	Apothecaries
AVERAGE DOSE—Tonic,	0.1 Gm.—	1½ grains.
Anti-malarial, at least	1 Gm.—	15 grains daily.

QUININÆ HYDROCHLORIDUM

Quinine Hydrochloride

Quin. Hydrochl.—Quinine Chloride

The hydrochloride [$C_{20}H_{24}O_2N_2.HCl+2H_2O=396.71$] of the alkaloid quinine. Preserve it in well-closed containers, protected from light.

Quinine Hydrochloride occurs in white, silky, glistening needles; odorless, and having a very bitter taste. The salt effloresces when exposed to warm air.

One Gm. of Quinine Hydrochloride dissolves in 18 mils of water, 0.8 mil of alcohol, 7 mils of glycerin, 0.7 mil of chloroform, and in 340 mils of ether at 25° C.; also in 0.5 mil of water at 80° C.

Its aqueous solution (1 in 20) is neutral or not more than slightly alkaline to litmus, and is not fluorescent, except when highly diluted, or when diluted sulphuric acid is added to it.

Silver nitrate T.S. produces in an aqueous solution of the salt a white precipitate, insoluble in nitric acid.

Add 1 or 2 drops of bromine T.S. to 1 mil of a solution of Quinine Hydrochloride (1 in 100) and then introduce 1 mil of ammonia water; an emerald-green color is produced due to the formation of thalleioquin.

Quinine Hydrochloride loses not more than 10 per cent. of its weight when dried to constant weight at 120° C.

Incinerate about 2 Gm. of Quinine Hydrochloride; not more than 0.05 per cent. of ash remains.

A solution of about 0.1 Gm. of the salt in 2 mils of sulphuric acid is not darker than light yellow (*organic impurities*); this solution is not colored red by the subsequent addition of a few drops of nitric acid (*morphine*).

Ten mils of an aqueous solution of the salt (1 in 50) acidulated with hydrochloric acid is not rendered more than faintly turbid by a few drops of barium chloride T.S. (*sulphate*).

The addition of a few drops of diluted sulphuric acid to 10 mils of an aqueous solution of the salt (1 in 20) produces no turbidity (*barium*).

Dissolve 2.75 Gm. of Quinine Hydrochloride in 20 mils of distilled water at 65° C. in a test tube of about 80 mils capacity, add a solution of 1.5 Gm. of crystallized sodium sulphate in 10 mils of distilled water warmed to 65° C., and maintain the mixture at this temperature for half an hour, shaking it frequently and thoroughly in the stoppered tube. Cool it to 15° C. and keep it at this temperature for two hours, shaking it occasionally. Now filter the liquid through a filter paper of from 8 to 10 cm. diameter and complete the test for other cinchona alkaloids with 5 mils of the filtrate as directed under *Quininæ Sulphas*.

	Metric	Apothecaries
AVERAGE DOSE—Tonic,	0.1 Gm.—	$1\frac{1}{2}$ grains.
Anti-malarial, at least	1 Gm.—	15 grains daily.

QUININÆ SALICYLAS

Quinine Salicylate

Quin. Salicyl.

The salicylate [$C_{20}H_{24}O_2N_2.C_7H_6O_3+H_2O = 480.28$] of the alkaloid quinine. Preserve it in well-closed containers, protected from light.

Quinine Salicylate occurs in colorless, odorless needles, having a bitter taste; permanent in the air. It often assumes a pinkish color on keeping.

One Gm. of Quinine Salicylate dissolves in 14 mils of alcohol, 13 mils of glycerin, 25 mils of chloroform, and in 160 mils of ether at 25° C.; slightly soluble in water.

Its saturated aqueous solution is alkaline to litmus and when this solution is treated with a drop of ferric chloride T.S., a violet color develops.

Add 1 or 2 drops of bromine T.S. to 10 mils of an aqueous solution of Quinine Salicylate and then introduce an excess of ammonia water; an emerald-green color is produced due to the formation of thalleioquin.

Quinine Salicylate loses not more than 5 per cent. of its weight when dried to constant weight at 100° C.

Incinerate about 2 Gm. of Quinine Salicylate; not more than 0.05 per cent. of ash remains.

Shake about 0.4 Gm. of the salt with 20 mils of distilled water and 1 mil of nitric acid; separate portions of 10 mils each of the filtered solution are not rendered more than slightly turbid by the addition of a few drops of barium chloride T.S. (*sulphate*), nor more than slightly opalescent by a few drops of silver nitrate T.S. (*chloride*).

Mix 2.21 Gm. of Quinine Salicylate in a separator with 10 mils of distilled water, add 5 mils of ammonia water, and shake the liquid with three successive portions of 25, 20 and 10 mils, respectively, of ether. Evaporate the combined ether solutions to dryness on a water bath, dissolve the residue in 20 mils of alcohol, dilute it with 50 mils of hot distilled water, and neutralize the liquid with normal sulphuric acid V.S., using methyl red T.S. as indicator. Evaporate it to dryness on a water bath, powder the residue, mix it with 20 mils of distilled water in a test tube, and complete the test for other cinchona alkaloids as directed under *Quininæ Sulphas*.

	Metric	Apothecaries
AVERAGE DOSE—Tonic,	0.1 Gm.—	$1\frac{1}{2}$ grains.
Anti-malarial, at least	1 Gm.—	15 grains daily.

QUININÆ SULPHAS

Quinine Sulphate

Quin. Sulph.

The sulphate $[(C_{20}H_{24}O_2N_2)_2.H_2SO_4+7H_2O = 872.62]$ of the alkaloid quinine. Preserve it in well-closed containers, protected from light.

Quinine Sulphate occurs in white, silky, light, flexible, glistening crystals, making a very light and easily compressible mass, or as hard, prismatic, monoclinic needles; odorless, and having a persistent, very bitter taste. It effloresces rapidly when exposed to dry air, and then becomes lusterless; when exposed to light, it acquires a brownish tint.

One Gm. of Quinine Sulphate dissolves in 725 mils of water, 107 mils of alcohol, and 30 mils of glycerin at 25° C.; also in 47 mils of water at 80° C., in about 12 mils of alcohol at 60° C.; slightly soluble in chloroform or ether. It is freely soluble in a mixture of 7 volumes of chloroform and 4 volumes of dehydrated alcohol.

Its saturated aqueous solution is neutral or not more than slightly alkaline to litmus, and, when acidulated with diluted sulphuric acid, develops a vivid blue fluorescence.

When heated to 60° C. or when exposed to dry air, it loses all but two molecules of its water of crystallization.

Barium chloride T.S. produces in an aqueous solution of the salt a white precipitate, insoluble in hydrochloric acid.

Add 1 or 2 drops of bromine T.S. to 10 mils of an aqueous solution of the salt (about 1 in 1000) and then introduce an excess of ammonia water; the liquid acquires an emerald-green color due to the formation of thalleioquin.

Quinine Sulphate loses not more than 16.2 per cent. of its weight when dried to constant weight at 110° C.

Incinerate about 2 Gm. of Quinine Sulphate; not more than 0.05 per cent. of ash remains.

One Gm. of the salt dissolves completely when heated to 50° C. in 7 mils of a mixture of 2 volumes of chloroform and 1 volume of dehydrated alcohol, and the solution remains clear on cooling (*ammonium sulphate or other inorganic salts*).

A solution of about 0.1 Gm. of the salt in 2 mils of sulphuric acid is not darker than light yellow (*organic impurities*); this solution is not colored red by the subsequent addition of a few drops of nitric acid (*morphine*).

Dry Quinine Sulphate (which must be neutral or slightly alkaline to litmus) at 50° C. for two hours, and then agitate 1.8 Gm. of the dried salt with 20 mils of distilled water at 65° C. for half an hour. Allow the mixture to cool to 15° C., macerate it at this temperature for two hours with occasional shaking and then filter it through a filter paper of from 8 to 10 cm. in diameter. Transfer 5 mils of this filtrate to a test tube and mix it gently (without shaking) with 7 mils of ammonia water, which must contain not less than 10 per cent. nor more than 10.2 per cent. of NH_3, have a temperature of 15° C., and be added at once. A clear liquid is produced (*other cinchona alkaloids*).

If the temperature during the maceration has been 16° C., 7.5 mils of ammonia water may be added; if 17° C., 8 mils may be added.

	Metric	Apothecaries
AVERAGE DOSE—Tonic,	0.1 Gm.—	1½ grains.
Anti-malarial, at least	1 Gm.—	15 grains daily.

QUININÆ TANNAS

Quinine Tannate

Quin. Tann.

A compound of the alkaloid quinine with tannic acid, of somewhat varying composition and containing not less than 30 per cent. nor more than 35 per cent. of anhydrous quinine ($C_{20}H_{24}O_2N_2$). Preserve it in well-closed containers, protected from light.

Quinine Tannate is a pale yellow or yellowish-white, amorphous powder; odorless and tasteless, or having not more than a slightly bitter and astringent taste.

Quinine Tannate is slightly soluble in water, chloroform, or ether; somewhat more soluble in alcohol.

When heated it melts to a purplish, viscous mass. Aqueous and alcoholic solutions of Quinine Tannate are colored blue-black by ferric chloride T.S.

Quinine Tannate loses not more than 10 per cent. of its weight when dried to constant weight at 100° C.

Incinerate about 0.5 Gm. of Quinine Tannate; not more than 0.3 per cent. of ash remains.

Shake about 0.5 Gm. of Quinine Tannate with 50 mils of distilled water and 1 mil of nitric acid and filter the mixture. Ten mils of this filtrate is not colored by 1 mil of hydrogen sulphide T.S.; other portions of the filtrate, 10 mils each, do not become more than slightly turbid on the addition of a few drops of silver nitrate T.S. (*chloride*) or on the addition of a few drops of barium chloride T.S. (*sulphate*).

Shake about 2 Gm. of Quinine Tannate, accurately weighed, with three successive portions of 25 mils each of anhydrous ether, filter the ether solutions, and wash the filter with 10 mils of anhydrous ether. Upon the evaporation of the combined filtrates and washings and drying at 100° C., the residue does not exceed 0.5 per cent. (*uncombined quinine*).

Assay—Mix about 0.5 Gm. of Quinine Tannate, accurately weighed, in a separator with 10 mils of distilled water and 10 mils of ammonia water, and shake the mixture with 20 mils of ether, then with successive 10 mil portions of ether until the quinine is completely extracted. Upon the evaporation of the combined ethereal liquids and drying the residue to a constant weight at 100° C., the weight of the anhydrous quinine so obtained corresponds to not less than 30 per cent. nor more than 35 per cent. of the weight of the Quinine Tannate taken.

The alkaloid obtained in the above assay responds to the identity tests under *Quinina*.

AVERAGE DOSE—Metric, 0.2 Gm.—Apothecaries, 3 grains.

RESINA

Rosin

Resin.—Colophony

The residue left after distilling the volatile oil from the concrete oleoresin obtained from *Pinus palustris* Miller and from other species of *Pinus* (Fam. *Pinaceæ*).

Rosin usually occurs in sharp, angular, translucent, amber-colored fragments, frequently covered with a yellow dust, brittle at the ordinary temperature; fracture shiny and shallow-conchoidal; odor and taste slightly terebinthinate.

It is freely soluble in alcohol, ether, benzene, glacial acetic acid, or fixed or volatile oils, it is also dissolved by dilute solutions of the fixed alkali hydroxides.

Its alcoholic solution is acid to litmus.

Specific gravity: 1.07 to 1.09 at 25° C.

It is easily fusible and burns with a dense yellowish smoke. Incinerate about 2 Gm. of Rosin; not more than 0.05 per cent. of ash remains.

The acid number of Rosin is not less than 150 (see Part II, Test No. 10).

Preparation—Emplastrum Resinæ.

RESINA JALAPÆ

Resin of Jalap

Res. Jalap.

Jalap, in No. 60 powder, *one thousand grammes* . . . . 1000 Gm.
Alcohol,
Water, each, *a sufficient quantity*.

Moisten the powder with *five hundred mils* of alcohol, and pack it in a cylindrical percolator; then add enough alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed slowly, gradually adding alcohol, until the percolate ceases to produce more than a slight turbidity when dropped into water. Distil off the alcohol until the percolate is reduced in weight to *two hundred and fifty grammes*, and add the latter slowly, with constant stirring, to *three thousand mils* of water. When the precipitate has subsided, decant the supernatant liquid, and wash the precipitate twice, by decantation, with fresh portions of *one thousand mils* each of hot water. After having drained off all of the liquid, transfer the Resin to a porcelain dish and heat it to dryness on a water bath.

Resin of Jalap consists of yellow to brown colored masses or fragments, breaking with a resinous, glassy fracture and translucent at the edges, or as a yellowish-gray to yellowish-brown powder, having a slight, peculiar odor, and a somewhat acrid taste. It is permanent in the air.

Resin of Jalap is soluble in alcohol in all proportions; insoluble in carbon disulphide, benzene, or fixed or volatile oils.

Its alcoholic solution is faintly acid to litmus.

Add 1 Gm. of the powdered Resin to 10 mils of chloroform in a stoppered flask and shake the mixture occasionally during one hour. Then filter, evaporate the filtrate in a tared dish and dry the residue to constant weight at 100° C.; it weighs not more than 0.3 Gm.

Add 1 Gm. of the powdered Resin to 10 mils of ether in a stoppered flask and shake the mixture occasionally during one hour. Then filter, evaporate the filtrate in a tared dish and dry the residue to constant weight at 100° C.; it weighs not more than 0.12 Gm. (*rosin, orizaba, or other resins*).

It is slowly but completely soluble in 5 times its weight of ammonia water, and the solution does not become gelatinous on standing. When this solution is acidified with hydrochloric acid, only a slight turbidity appears (*rosin, guaiac, or other resins*).

When Resin of Jalap is heated at 100° C. no material loss in weight is observed (*water*).

When Resin of Jalap is triturated with distilled water, the latter does not become colored, none of the Resin dissolves (*soluble impurities*), and the water does not have a bitter taste (*aloin*).

Shake 0.02 Gm. of Resin of Jalap with 5 mils of ether, filter and evaporate the ethereal filtrate on a piece of filter paper; no greenish-blue color is produced by the application of a drop of ferric chloride T.S. to the filter paper (*guaiac*).

One Gm. of Resin of Jalap when dissolved in 50 mils of alcohol, containing 1 mil of phenolphthalein T.S., requires not more than 0.5 mil of half-normal alcoholic potassium hydroxide V.S. to produce a red color (*acid resins*).

Dissolve 0.02 Gm. of Resin of Jalap in 2 mils of glacial acetic acid and add a few drops of sulphuric acid; the mixture does not acquire a pink color (*rosin*).

Preparation—Pilulæ Catharticæ Compositæ.

AVERAGE DOSE—Metric, 0.125 Gm.—Apothecaries, 2 grains.

RESINA PODOPHYLLI

Resin of Podophyllum

Res. Podoph.—Podophyllin

PODOPHYLLUM, in No. 60 powder, *one thousand grammes*	1000 Gm.
HYDROCHLORIC ACID, *ten milliliters*	10 mils
ALCOHOL,	
WATER, each, *a sufficient quantity.*	

Moisten the powder with *five hundred mils* of alcohol and pack it in a cylindrical percolator; then add enough alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed, gradually adding alcohol, until the percolate ceases to produce more than a slight turbidity when dropped into water. Distil off the alcohol until the percolate is reduced to the consistence of a thin syrup, and pour this slowly, with constant stirring, into *one thousand mils* of water, mixed with the hydrochloric acid and cooled to a temperature below 10° C. When the precipitate has subsided, decant the supernatant liquid, and wash the precipitate twice by decantation with fresh portions of *one thousand mils* of cold water. Spread it in a thin layer upon a strainer and dry the Resin by exposure to the air, in a cool place, protected from the light. Should it coalesce during the drying or aggregate into lumps having a glossy surface, break it into pieces, and powder it in a mortar.

Preserve it in well-closed containers, protected from light.

Resin of Podophyllum is an amorphous powder varying in color from light brown to greenish-yellow, turning darker when subjected to a temperature exceeding 25° C., or when exposed to light. It has a slight, peculiar odor and a faintly bitter taste. *It is very irritating to the eyes, and to mucous membrane.*

It is soluble in alcohol with only a slight opalescence. The alcoholic solution is faintly acid to litmus. Not less than 75 per cent. of Resin of Podophyllum is soluble in ether and not less than 65 per cent. is soluble in chloroform.

A hot aqueous solution of Resin of Podophyllum deposits most of its contents on cooling, and if the cooled liquid is filtered, the filtrate has a bitter taste, and turns brown upon the addition of a few drops of ferric chloride T.S.

It is soluble in potassium or sodium hydroxide T.S., forming a deep yellow liquid, which gradually becomes darker on standing, and from which the Resin is reprecipitated by acids.

Add 0.4 Gm. of Resin of Podophyllum to 3 mils of 60 per cent. alcohol, introduce 0.5 mil of potassium hydroxide T.S., and gently shake the mixture; it does not gelatinize (*difference from Resin obtained from Podophyllum Emodi*).

Resin of Podophyllum yields not more than 1.5 per cent. of ash.

AVERAGE DOSE—Metric, 0.01 Gm.—Apothecaries, 1/6 grain.

RESINA SCAMMONIÆ

Resin of Scammony

Res. Scamm.

SCAMMONY ROOT, in No. 30 powder, *one thousand grammes*	1000 Gm.
ALCOHOL,	
WATER, each, *a sufficient quantity.*	

Moisten the scammony root with sufficient alcohol, pack it in a cylindrical percolator, then add enough alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for forty-eight hours. Then allow the percolation to proceed, gradually adding alcohol, until the percolate ceases to produce more than a slight turbidity when dropped into water. Distil off the alcohol until the percolate is reduced to the consistence of thin syrup, and pour this slowly, with constant stirring, into *one thousand mils* of hot water. When the precipitate has subsided, decant the supernatant liquid, wash the precipitated Resin twice by decantation with fresh portions of *one thousand mils* each of hot water and dry the Resin on a water bath.

Resin of Scammony consists of brownish, translucent masses or fragments, breaking with a glossy, resinous fracture; odor characteristic and agreeable.

It is soluble in alcohol in all proportions, and not less than 95 per cent. is soluble in ether (distinction from *resin of jalap and resin of false scammony*). When triturated with water, it does not form an emulsion. Ammonia water and solutions of the alkali hydroxides dissolve it with the aid of gentle heat, and from these solutions the Resin is not reprecipitated by dilute acids. Its solution in alcohol does not give a blue color with ferric chloride T.S. or with solution of hydrogen dioxide (*guaiac*).

Sulphuric acid does not turn red when stirred in a porcelain dish with an equal weight of Resin of Scammony (*rosin*).

Resin of Scammony yields not more than 1 per cent. of ash.

Preparation—Extractum Colocynthidis Compositum.

Average dose—Metric, 0.2 Gm.—Apothecaries, 3 grains.

RESORCINOL

Resorcinol

Resorcin.—Resorcin

Metadihydroxybenzene. It contains not less than 99.5 per cent. of $C_6H_4(OH)_2$ 1 : 3 (110.05). Preserve it in well-closed containers, protected from light.

Resorcinol occurs in colorless, or nearly colorless, needle-shaped crystals, or as a powder, having a faint, peculiar odor and a sweetish, followed by a bitter, taste. It acquires a pink tint on exposure to light and air.

One Gm. of Resorcinol dissolves in 0.9 mil of water and in 0.9 mil of alcohol at 25° C.; also in about 0.2 mil of water at 80° C.; freely soluble in glycerin or ether; slightly soluble in chloroform.

Its aqueous solution (1 in 20) is neutral or only faintly acid to litmus.

It melts between 109° and 111° C.

The addition of a few drops of ferric chloride T.S. to 10 mils of an aqueous solution of Resorcinol (1 in 200) produces a bluish-violet color, changing to brownish-yellow on the addition of ammonia water (distinction from *catechol and quinol*).

Dissolve 0.1 Gm. of Resorcinol in 1 mil of potassium hydroxide T.S. and then add a drop of chloroform; the mixture upon being heated assumes an intense, crimson color, and if a slight excess of hydrochloric acid is then added, the color changes to a pale straw-yellow.

Incinerate about 2 Gm. of Resorcinol; not more than 0.05 per cent. of ash remains.

Lead acetate T.S. produces no precipitate when added to an aqueous solution of Resorcinol (1 in 20) (*catechol*).

An aqueous solution of Resorcinol (1 in 20) does not emit the odor of phenol when gently warmed.

Assay—Dissolve about 1.5 Gm. of Resorcinol, accurately weighed, in sufficient distilled water to make 500 mils. Transfer 25 mils of the solution to a 500 mil, glass-stoppered flask having a long and narrow neck, add 50 mils of tenth-normal bromine V.S., and dilute with 50 mils of distilled water. Then add 5 mils of hydrochloric acid and at once stopper the flask. Shake the liquid and allow it to stand for one minute, then dilute it with 20 mils of distilled water, add 5 mils of potassium iodide T.S. and allow it to stand for five minutes. The titration of the liberated iodine with tenth-normal sodium thiosulphate V.S., starch T.S. being used as indicator, shows not less than 99.5 per cent. of $C_6H_4(OH)_2$.

Each mil of tenth-normal bromine V.S. corresponds to 0.001834 Gm. of $C_6H_4(OH)_2$. Each gramme of Resorcinol corresponds to not less than 542.5 mils of tenth-normal bromine V.S.

Average dose—Metric, 0.125 Gm.—Apothecaries, 2 grains.

RHEUM

Rhubarb

The rhizomes and roots of *Rheum officinale* Baillon, *Rheum palmatum* Linné, and the var. *tanguticum* Maximowicz (Fam. *Polygonaceæ*), and probably other species of *Rheum* grown in China and Thibet, deprived of most of the bark tissues and carefully dried. Preserve Rhubarb in tightly-closed containers, adding a few drops of chloroform or carbon tetrachloride, from time to time, to prevent attack by insects.

In sub-cylindrical, barrel-shaped, or conical pieces known in commerce as "rounds," or in plano-convex pieces known in commerce as "flats," or in irregularly formed pieces, frequently with perforations. It is hard and moderately heavy; attaining a length of 17 cm. and a diameter of 10 cm., often cut in pieces of variable form and size; outer surfaces yellowish-brown, mottled, with alternating, longitudinal striæ of grayish-white parenchyma and reddish or brownish medullary rays; small stellate groups of fibro-vascular tissue and occasionally reddish-brown cork patches, smooth and sometimes covered with a bright, brownish-yellow powder; fracture uneven and granular, presenting a characteristic mottled appearance; odor aromatic, characteristic; taste characteristic, slightly bitter and astringent, gritty when chewed and tingeing the saliva yellow.

Under the microscope, sections of Rhubarb show numerous thin-walled parenchymatous cells containing either a large number of starch grains or a single large rosette aggregate of calcium oxalate; scattered among the parenchyma are stellate groups of compound fibro-vascular bundles, the latter composed of narrow medullary rays separating the wedges, having large tracheæ in the outer part and separated by a prominent cambium from an internal phloem or sieve; among the grayish-white parenchyma of the inner bark occur narrow, yellowish-brown, irregular medullary rays.

Not more than 15 per cent. of the drug should show a hollow or dark central area.

The powder is bright orange-yellow to yellowish-brown; becoming red with alkalies; when examined under the microscope it exhibits calcium oxalate in rosette aggregates, mostly from 0.05 to 0.1 mm. in diameter, occasionally attaining a diameter of 0.15 mm.; starch grains numerous, somewhat spherical, single or 2- to 4-compound, each with a single cleft, from 0.002 to 0.02 mm. in diameter; tracheal fragments few, mostly reticulate, occasionally spiral.

Boil 0.1 Gm. of powdered Rhubarb with 10 mils of an aqueous solution of potassium hydroxide (1 in 100); allow it to cool, filter, acidulate the filtrate with hydrochloric acid and shake it with 10 mils of ether; on standing the ethereal layer is colored yellow. Shake this ethereal solution with 5 mils of ammonia water; the latter is colored cherry-red (presence of *emodin*) and the ethereal layer remains yellow (presence of *chrysophanic acid*).

Rhubarb, when exhausted with diluted alcohol, yields not less than 30 per cent. of dry extract.

Rhubarb yields not more than 13 per cent. of ash.

Preparations—Extractum Rhei Fluidextractum Rhei Pilulæ Rhei Compositæ Pulvis Rhei Compositus Syrupus Rhei (from Fluidextract) Syrupus Rhei Aromaticus (from Aromatic Tincture) Tinctura Rhei Tinctura Rhei Aromatica.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

ROSA GALLICA

Red Rose

Rosa Gall.

The dried petals of *Rosa gallica* Linné (Fam. *Rosaceæ*), collected just before the expansion of the flower. Preserve Red Rose in tightly-closed containers, protected from the light.

Petals either separate or imbricated in small cones, broadly ovate, summit rounded and deeply notched, margin entire and somewhat recurved, base obtuse; externally of a purplish-red color except the light-brown claw; texture velvety; when dry brittle; odor agreeable; taste astringent and slightly bitter.

Under the microscope, transverse sections of the petals of Red Rose show the upper epidermal cells modified to conical papillæ and containing a purplish-red cell sap; a loose mesophyll composed of from 2 to 10 rows of cells among which are the fibro-vascular bundles with spiral tracheæ, and a lower epidermis of rectangular cells filled with a purple cell sap.

Red Rose yields not more than 3.5 per cent. of ash.

Preparations—Fluidextractum Rosæ Mel Rosæ (from Fluidextract).

SABAL

Sabal

Saw Palmetto Berries

The partially dried, ripe fruit of *Serenoa serrulata* (Michaux) Hooker filius (Fam. *Palmæ*). Preserve Sabal in tightly-closed containers, adding a few drops of chloroform or carbon tetrachloride, from time to time, to prevent attack by insects.

Ellipsoidal or ovoid, occasionally compressed, from 1.5 to 3 cm. in length and from 1 to 1.5 cm. in diameter; externally brownish-black to bluish-black, smooth and somewhat oily, with a few large, more or less angular depressions due to the contraction of the inner layer on drying, summit marked by the scar of the style, and the base either with a short stalk or stem-scar; epicarp and sarcocarp together forming a thin coriaceous shell enclosing a hard but thin endocarp, which is externally reddish-brown and somewhat fibrous as is also the inner layer of the sarcocarp; inner layer of endocarp smooth, enclosing a hard, ellipsoidal or ovoid, somewhat flattened, reddish-brown seed; odor pronounced, aromatic; taste sweetish, aromatic, slightly acrid.

The powder is yellowish-brown; when examined under the microscope it exhibits large, irregular fragments; parenchyma cells of sarcocarp containing a yellowish-brown or brownish-red, amorphous substance; whitish fragments of endosperm; the walls being considerably thickened and with large pores; stone cells occasional, nearly colorless, more or less tabular or irregular in shape, about 0.125 mm. in length, walls about 0.015 mm. in thickness, and with numerous simple or branching pores.

Preparation—Fluidextractum Sabal.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

SACCHARUM

Sugar

Sacch.—Sucrose

Sucrose [$C_{12}H_{22}O_{11}=342.18$] obtained from cultivated varieties of *Saccharum officinarum* Linné (Fam. *Gramineæ*), and from *Beta vulgaris* Linné, var. *Rapa* Dumort (Fam. *Chenopodiaceæ*) and from other sources.

Sugar occurs in white, hard, dry crystals or as a white, crystalline powder, odorless, and having a sweet taste. It is permanent in the air.

One Gm. of Sugar dissolves in 0.5 mil of water and in 170 mils of alcohol at 25° C.; also in slightly over 0.2 mil of boiling water; insoluble in chloroform or ether.

Its aqueous solution (1 in 20) is neutral to litmus and is dextrorotatory.

The specific rotation $[\alpha]_D$ of Sugar, determined at 20° C., in a solution in distilled water, containing in 100 mils the equivalent of 26 Gm. of Sugar, previously dried to a constant weight at 105° C., and using a 200 mm. tube, is not less than +65.9° (see Part II, Test No. 21).

Its aqueous solution saturated at 25° C. has a specific gravity of about 1.340.

Incinerate about 2 Gm. of Sugar; not more than 0.05 per cent. of ash remains.

An aqueous solution of Sugar (2 in 1) is colorless when viewed horizontally through a vertical cylinder of colorless glass having an inside diameter of about 25 mm.

When kept in large, well-closed, and completely filled bottles, the solution deposits no sediment on prolonged standing (*insoluble salts, ultramarine, Prussian-blue*).

Ten mil portions of an aqueous solution of Sugar (1 in 10) tested separately give no precipitate with an equal volume of hydrogen sulphide T.S., and not more than a faint opalescence with a few drops of ammonium oxalate T.S. (*calcium*), barium nitrate T.S. (*sulphate*), and silver nitrate T.S. (*chloride*).

Dissolve 20 Gm. of Sugar in enough distilled water to make 100 mils and filter the solution if necessary To 50 mils of the clear liquid, contained in a 250 mil beaker, add 50 mils of alkaline cupric tartrate V.S., heat the mixture at such a rate that approximately four minutes are required to bring it to the boiling point, and then boil it for exactly two minutes. Add 100 mils of cold, recently boiled distilled water, and collect and weigh the precipitated cuprous oxide in the following manner:

Prepare a Gooch crucible with an asbestos layer. Thoroughly wash the asbestos with distilled water, followed successively by 10 mils of alcohol and 10 mils of ether; dry it at 100° C. for thirty minutes and then weigh the prepared crucible. Collect the precipitated cuprous oxide on the asbestos, thoroughly wash it with hot distilled water, then with 10 mils of alcohol, and finally with 10 mils of ether and dry it at 100° C. The weight of the cuprous oxide does not exceed 0.155 Gm., corresponding to not more than 0.5 per cent. of invert sugar.

Preparations—Syrupus Also used in other official syrups and preparations.

SACCHARUM LACTIS

Sugar of Milk

Sacch. Lact.—Milk Sugar Lactose

Lactose [$C_{12}H_{22}O_{11}+H_2O=360.19$] obtained from the whey of cow's milk. Preserve it in tightly-closed containers.

Sugar of Milk occurs in white, hard, crystalline masses, or as a white powder, producing a gritty sensation on the tongue; odorless, and having a faintly sweet taste. It is permanent in the air. It readily absorbs odors.

One Gm. of Sugar of Milk dissolves in 4.9 mils of water at 25° C.; also in 2.6 mils of boiling water; almost insoluble in alcohol ; insoluble in chloroform or ether.

An aqueous solution of Sugar of Milk (1 in 20) is neutral to litmus and is dextrorotatory.

The specific rotation $[\alpha]_D$ of Sugar of Milk, determined at 25° C., in a solution in distilled water, containing in 100 mils the equivalent of 10 Gm. and using a 200 mm. tube, is from +52.2° to +52.5° (see Part II, Test No. 21).

Add an equal volume of sodium hydroxide T.S. to 5 mils of a hot, saturated, aqueous solution of Sugar of Milk and gently warm the mixture; the liquid turns yellow and finally brownish-red. On the subsequent addition of a few drops of cupric sulphate T.S., a precipitate of cuprous oxide appears.

Incinerate about 1 Gm. of Sugar of Milk; not more than 0.1 per cent. of ash remains.

A solution of 3 Gm. of Sugar of Milk in 10 mils of boiling distilled water is odorless, clear, and colorless or at most faintly yellow.

Add 20 mils of alcohol (70 per cent. by volume) to 2 Gm. of Sugar of Milk in a fine powder, shake the mixture frequently during half an hour at 15° C. and then filter it. Ten mils of the filtrate remains clear after admixture with an equal volume of dehydrated alcohol (*dextrin*), and this liquid, upon evaporation on a water bath, leaves not more than 0.03 Gm. of residue (*sucrose or glucose*).

An aqueous solution of Sugar of Milk (1 in 20) does not respond to the Test for heavy metals (see Part II, Test No. 3).

On boiling about 1 Gm. of powdered Sugar of Milk with 50 mils of distilled water and cooling the solution, no blue color is produced upon the addition of one drop of iodine T.S. (*starch*).

SALICINUM

Salicin

Salicin.

A glucoside [$C_{13}H_{18}O_7 = 286.14$] obtained from several species of *Salix* and *Populus* (Fam. *Salicaceæ*). Preserve it in well-closed containers.

Salicin occurs in colorless, silky, shining, crystalline needles or rhombic prisms, or as a white, crystalline powder; odorless, and having a very bitter taste.

One Gm. of Salicin dissolves in 23.5 mils of water and in 88.5 mils of alcohol at 25° C.; also in 3.3 mils of water at 80° C. and in 30 mils of alcohol at 60° C.; insoluble in chloroform or ether.

Its aqueous solution (1 in 30) is neutral to litmus and is lævorotatory.

It melts between 198° and 202° C.

Heat a small portion of Salicin in a test tube until it turns brown, then add a few mils of distilled water, and afterwards a drop of ferric chloride T.S.; a violet color is produced.

Salicin with sulphuric acid gives a red color which disappears upon the addition of distilled water.

Heat gently about 0.1 Gm. of Salicin with about 0.2 Gm. of potassium dichromate and 2 mils of diluted sulphuric acid; the fragrant odor of salicylic aldehyde is developed.

Incinerate about 2 Gm. of Salicin; not more than 0.05 per cent. of ash remains.

Ten mils of an aqueous solution of Salicin (1 in 50) is not colored violet by a few drops of ferric chloride T.S. (*salicylic acid*).

Separate portions of 10 mils each of an aqueous solution of Salicin (1 in 50) yield no precipitate on the addition of 1 mil of tannic acid T.S., picric acid T.S., or mercuric potassium iodide T.S. (*alkaloids*).

An aqueous solution of Salicin does not respond to the Test for heavy metals (see Part II, Test No. 3).

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

SANGUINARIA

Sanguinaria

Sanguin.—Blood Root

The dried rhizome and roots of *Sanguinaria canadensis* Linné (Fam. *Papaveraceæ*).

Of horizontal growth, occasionally branching, more or less cylindrical, somewhat flattened, from 2 to 7 cm. in length, and from 5 to 15 mm. in diameter; externally dark brown, slightly annulate, with a few stem-scars on the upper surface and numerous more or less broken filiform roots and root-scars on the lower surface; fracture short and somewhat waxy, brownish-red, occasionally yellowish-white, with numerous, small, circular, yellowish fibro-vascular bundles within about 1 mm. of the epidermis, pith very large; odor slight; taste persistently acrid and bitter.

Under the microscope, transverse sections of the rhizome of Sanguinaria show an outer layer of a single row of thin-walled epidermal cells; a cortex of from 10 to 15 rows of thin-walled parenchyma cells containing numerous starch grains, or a small amount of fixed oil; a zone of cambium, most of which is interfascicular; a narrow circular zone of small collateral fibro-vascular bundles, separated from each other by parenchyma; pith large, consisting of starch-bearing parenchyma cells; latex cells containing a red or orange colored secretion, either isolated or connected into irregular chains and distributed among the parenchymatous cells of the middle bark and pith; sections treated with glycerin show in the secretion cells, after twenty-four hours, spheroidal aggregates of crystals which strongly polarize light.

The powder is brownish-red, sternutatory; when examined under the microscope it exhibits numerous starch grains, from 0.003 to 0.02 mm. in diameter, being mostly single, seldom 2- to 3-compound, the individual grains nearly spherical or ovoid, sometimes more or less plano-convex, somewhat resembling those of wheat starch in outline but polarizing light more strongly; numerous fragments of short latex cells with reddish-brown resinous masses; tracheal fragments few, having numerous slit-like pores.

Preparation—Tinctura Sanguinariæ.

AVERAGE DOSE—Metric, 0.125 Gm.—Apothecaries, 2 grains.

SANTALUM RUBRUM

Red Saunders

Santal. Rub.

The heart-wood of *Pterocarpus santalinus* Linné filius (Fam. *Leguminosæ*).

Usually in the form of a coarse powder, of a brownish-red or dark saffron color and nearly odorless and tasteless.

Under the microscope, Red Saunders shows numerous wood-fibers which are mostly irregular in outline, with sharply pointed and occasionally forked ends, the individual fibers from 0.3 to 0.75 mm. in length, the walls being very thick, porous, yellowish, unevenly thickened, and strongly lignified, and the lumina being filled with a fine, granular, protoplasmic content; occasional tracheæ with simple or bordered pores and filled with light lemon-yellow, resinous masses; occasionally fragments showing medullary rays in narrow elliptical groups 1 cell wide and 3 to 6 cells deep; also occasional groups of crystal fibers with calcium oxalate in the form of monoclinic prisms, from 0.01 to 0.02 mm. in diameter. Mounts in hydrated chloral T.S. are of a deep, rich red color.

Add 0.5 Gm. of Red Saunders to 10 mils of alcohol; the solution becomes distinctly red. Add 0.5 Gm. of Red Saunders to 10 mils of ether, the solution assumes an orange-yellow color and when held in a bright light shows a distinct, greenish fluorescence. Add 0.005 Gm. of Red Saunders to 10 mils of water; the liquid remains clear and colorless.

Red Saunders yields not more than 3 per cent. of ash.

Preparation—Tinctura Lavandulæ Composita.

SANTONINUM

Santonin

Santonin.

The inner anhydride or lactone [$C_{15}H_{18}O_3 = 246.14$] of santonic acid obtained from *Artemisia pauciflora* (Ledebour) Weber (Fam. *Compositæ*). Preserve it in well-closed containers, protected from light.

Santonin occurs in colorless, shining, flattened rhombic prisms, or as a crystalline powder; odorless, and nearly tasteless at first, but afterwards developing a bitter taste; permanent in the air; it becomes yellow on exposure to light. Santonin which has become yellow may be reconverted into colorless crystals by recrystallization from alcohol.

One Gm. of Santonin dissolves in 43 mils of alcohol, 1.7 mils of chloroform, and in 110 mils of ether at 25° C.; also in 6.5 mils of boiling alcohol; very slightly soluble in water; slightly soluble in boiling water.

Its solutions are neutral to litmus and are lævorotatory.

It melts between 169° and 171° C.

Heat about 0.5 Gm. of Santonin with 5 mils of alcoholic potassium hydroxide T.S.; a red color is developed.

Shake about 0.01 Gm. of Santonin with a cooled mixture of 1 mil each of sulphuric acid and distilled water, heat the solution to 100° C., and add a minute trace of a very dilute solution of ferric chloride; a violet color results.

Incinerate about 1 Gm. of Santonin; not more than 0.1 per cent. of ash remains.

Two mils of sulphuric acid added to about 0.1 Gm. of Santonin produces not more than a faint, yellow color (*readily carbonizable organic impurities*).

Boil about 2 Gm. of Santonin with 80 mils of distilled water and 5 mils of diluted sulphuric acid, allow the liquid to become cold and then filter it. The addition of mercuric potassium iodide T.S. or of iodine T.S. to 10 mils of the filtrate, mixed with 10 mils of distilled water, produces no cloudiness, even after standing for three hours (*alkaloids*).

AVERAGE DOSE—Metric, 0.06 Gm.—Apothecaries, 1 grain.

SAPO

Soap

White Castile Soap

Soap prepared from olive oil and sodium hydroxide. Preserve dried or powdered Soap in well-closed containers.

Soap occurs as a white or whitish solid, in the form of bars, hard, yet easily cut when fresh, or as a fine, yellowish-white powder, having a faint, peculiar odor, free from rancidity, and a disagreeable, alkaline taste.

It is soluble in water and in alcohol, more readily, however, with the aid of heat. Its aqueous solution is alkaline to litmus.

Dissolve about 0.5 Gm. of Soap, accurately weighed, in 10 mils of alcohol, evaporate the mixture to dryness in a tared beaker containing 1 Gm. of clean sand, which has been previously dried at 110° C. Dry the residue at 110° C. to constant weight. The loss does not exceed 36 per cent. for unpowdered Soap or 10 per cent. for powdered Soap (*water*).

A solution of a quantity of Soap corresponding to 0.64 Gm. of dried Soap in 25 mils of hot alcohol does not gelatinize on cooling to 20° C. (*soap from animal fats*).

Ten mils of an aqueous solution of Soap (1 in 20) remains unchanged in color upon the addition of ammonium sulphide T.S., and upon acidulating another portion of 10 mils of the solution with hydrochloric acid and filtering, the filtrate remains unchanged in color when an equal volume of hydrogen sulphide T.S. is added and the mixture allowed to stand well-stoppered, in a warm place, for half an hour (*metallic impurities*).

Dissolve about 10 Gm. of Soap, accurately weighed, in 100 mils of alcohol, with the aid of heat. Transfer the undissolved residue, if any, to a tared filter which has been dried at 100° C. and wash it thoroughly with boiling alcohol. Its weight, after drying at 100° C., does not exceed 1 per cent. of the weight of dry Soap in the original weight taken (*sodium chloride, sodium carbonate, silica*). The weight of this residue, thoroughly washed with distilled water and dried at 100° C., does not exceed 0.15 per cent. of the weight of dry Soap in the original weight taken (*silica and other accidental impurities*).

The alcoholic filtrate and washings from the preceding test are not reddened by 3 drops of phenolphthalein T.S. (*sodium hydroxide*).

Dissolve about 10 Gm. of Soap in 200 mils of hot distilled water, add 2 drops of methyl orange T.S. and then diluted sulphuric acid with constant stirring until the aqueous layer becomes red. Boil the mixture until the supernatant layer of the fatty acids is clear and free from solid particles. Separate the aqueous layer with the aid of a siphon and wash the fatty acids by decantation with hot distilled water, until 10 mils of the washings, acidulated with a drop of hydrochloric acid, no longer gives a precipitate on the addition of barium chloride T.S. Now place the dish containing the fatty acids on a water bath and heat until the fatty acids are completely liquefied, then filter the warm acids through a dry filter in a hot-water funnel into a flat dish and dry the acids over sulphuric acid. The iodine number of the acids thus obtained is not less than 84 nor more than 90 (see Part II, Test No. 8).

Preparations—Extractum Colocynthidis Compositum Linimentum Saponis Linimentum Chloroformi (from Soap Liniment).

SAPO MOLLIS

Soft Soap

Sapo Moll.

Cottonseed Oil, *four hundred and thirty grammes*	430 Gm.
Potassium Hydroxide, *eighty-six grammes*	86 Gm.
Alcohol, *fifty milliliters*	50 mils
Water, *a sufficient quantity,*	
To make *one thousand grammes*	1000 Gm.

Dissolve *eighty-six grammes* of potassium hydroxide in *one hundred mils* of water in a tared, capacious dish with the aid of heat. Immediately add *four hundred and thirty grammes* of cottonseed oil to the hot solution and stir the mixture actively for a few moments. Then reapply the heat and, at the first evidence of froth from boiling, pour in the *fifty mils* of alcohol, stir it actively until the froth suddenly rises, then withdraw the heat and again stir until the Soap assumes the consistence of a paste. Now determine by the method given below whether the product will contain the required excess of potassium hydroxide when water is added to make *one thousand grammes*. If the product does not meet the requirements of this test, add more potassium hydroxide or cottonseed oil as may be needed and again heat it until the saponification is complete. Finally add enough water to make the finished product weigh *one thousand grammes* and warm it gently, stirring carefully, until the water is all absorbed and a clear soap results.

The potassium hydroxide used in this process should be of the full strength directed by the Pharmacopœia (85 per cent.). Potassium hydroxide of any other strength, however, may be used, if a proportionally larger or smaller quantity is taken, the proper amount for the above formula being ascertained by dividing 7310 by the percentage of KOH contained therein.

Soft Soap is a soft, unctuous, yellowish-white to brownish-yellow mass, having a slight, characteristic odor and an alkaline taste.

An aqueous solution of Soft Soap is alkaline to litmus and phenolphthalein T.S.; a solution in hot distilled water (1 in 20) is nearly clear.

Dissolve about 5 Gm. of Soft Soap, accurately weighed, in 100 mils of hot alcohol, collect the residue, if any, on a filter, thoroughly wash it with hot alcohol, and dry it to a constant weight at 100° C. The weight of the residue does not exceed 3 per cent. of the weight of Soap taken. The combined filtrate and washings, on the addition of 0.5 mil of phenolphthalein T.S. and titration with tenth-normal sulphuric acid V.S., shows not less than 0.1 per cent. nor more than 0.25 per cent. of KOH.

Each mil of tenth-normal sulphuric acid V.S. used corresponds to 0.00561 Gm. of KOH.

Soft Soap loses not more than 52 per cent. in weight, when tested for water as directed under *Sapo*.

Preparation—Linimentum Saponis Mollis.

SARSAPARILLA

Sarsaparilla

Sarsap.

The dried root of *Smilax medica* Chamisso and Schlechtendal, known in commerce as Mexican Sarsaparilla; or *Smilax officinalis* Kunth, or an undetermined species of *Smilax*, known in commerce as Honduras Sarsaparilla; or *Smilax ornata* Hooker filius, known in commerce as Jamaica Sarsaparilla (Fam. *Liliaceæ*).

Mexican Sarsaparilla—In loose bundles, or pressed into bales, single bundles attaining a length of 60 cm. and composed of from 20 to 35 folded roots attached to a crown with one or more stout stems; roots from 3.5 to 6 mm. in diameter; externally grayish-brown to dark brown, minutely hairy, longitudinally furrowed, the furrows containing more or less of a blackish earth; fracture tough, fibrous; internally light brown with a more or less shrunken, mealy or sometimes horny cortex surrounding the porous central cylinder, pith distinct; nearly inodorous; taste mucilaginous, somewhat sweetish and acrid.

Remove the woody, knotty crown with portions of the overground stems.

Honduras Sarsaparilla—In more or less compact, cylindrical bundles, attaining a length of 55 cm. and a diameter from 8 to 15 cm., consisting of the long, folded roots bound together by roots of the same plant; roots from 2 to 6 mm. in diameter; externally dark- or reddish-brown, longitudinally furrowed, the furrows usually free from soil; fracture fibrous; internally consisting of a grayish-white or dark brown cortex, a light yellow and porous central cylinder and a whitish pith; taste mucilaginous and slightly acrid.

Jamaica Sarsaparilla—In more or less compact and somewhat flattened bundles, from 30 to 45 cm. in length and from 10 to 15 cm. in width, consisting of the folded roots loosely bound with roots of the same plant; roots from 2 to 5 mm. in diameter; externally grayish-brown to reddish-brown, longitudinally wrinkled, more or less furrowed and bearing numerous coarse fibrous rootlets; taste somewhat sweet and slightly bitter.

Under the microscope, transverse sections of all of the commercial varieties of Sarsaparilla show an epidermal layer with basal portions of root hairs; a hypodermis composed of several layers of strongly lignified cells, the walls being uniformly thickened, except in Mexican Sarsaparilla in which the inner walls are only slightly thickened; a cortex composed of numerous parenchyma cells mostly containing starch, some containing resin or raphides of calcium oxalate; an endodermis of a single layer of strongly lignified cells, the walls being uniformly thickened except in Mexican Sarsaparilla in which the outer walls are only slightly thickened; a central cylinder composed of radial bundles connected with sclerenchymatous fibers, the tracheæ being large and oval and the phloem in small groups at the periphery of the bundle; and a pith composed of starch-bearing parenchyma cells.

Powdered Sarsaparilla is light grayish-brown to dark grayish-brown; when examined under the microscope it exhibits numerous starch grains, from 0.003 to 0.023 mm. in diameter, spherical, or biconvex or spherical-tetrahedral, single to 2- to 4-compound, and frequently with a central-elliptical cleft; calcium oxalate in raphides, from 0.006 to 0.035 mm. in diameter, occurring singly or in groups; cells of the hypodermis and endodermis with lemon-yellow or reddish-yellow porous walls and, in the case of Mexican Sarsaparilla, showing an uneven or irregular thickening, the individual cells from 0.08 to 0.5 mm. in length; fragments of tracheæ with simple and bordered pores or scalariform or reticulate thickenings associated with sclerenchymatous fibers having rather thin, very slightly lignified and porous walls.

Sarsaparilla yields not more than 10 per cent. of ash.

Preparations—Fluidextractum Sarsaparillæ Fluidextractum Sarsaparillæ Compositum Syrupus Sarsaparillæ Compositus (from Fluidextract).

AVERAGE DOSE—Metric, 2 Gm.—Apothecaries, 30 grains.

SASSAFRAS

Sassafras

Sassaf.

The bark of the root of *Sassafras variifolium* (Salisbury) O. Kuntze (Fam. *Lauraceæ*), without the presence or admixture of more than 2 per cent. of adhering wood, collected in the early spring or autumn, deprived of the outer corky layer and dried.

In irregularly transversely curved or quilled pieces, from 1 to 15 cm. in length and from 1 to 4 mm. in thickness; outer surface orange-brown, nearly smooth and marked with more or less irregular ridges; inner surface light to dark reddish-brown, obscurely short-striate; fracture short with a thin reddish-brown corky layer and a yellowish-white inner bark; odor aromatic; taste slightly mucilaginous, astringent, aromatic and somewhat pungent.

The powder is light reddish-brown; when examined under the microscope it exhibits numerous starch grains and prominent, characteristic bast-fibers; starch grains either single or 2- to 4-compound, the individual grains being more or less spherical or polygonal and frequently with a distinct cleft, from 0.003 to 0.02 mm. in diameter, some of the swollen or altered grains attaining a diameter of 0.03 mm.; bast-fibers spindle-shaped, occasionally very irregular in outline, with sharply pointed ends, from 0.15 to 0.4 mm. in length, about 0.025 mm. in diameter, and with very thick, strongly lignified walls, the lumina being frequently nearly obliterated; parenchyma cells containing either starch grains or irregular yellowish-red masses of tannin and becoming bluish-black upon the addition of ferric chloride T.S.; fragments of wood few, with large, thin-walled tracheæ marked by simple pores and associated with rather thin-walled wood-fibers.

Sassafras yields not more than 30 per cent. of ash.

Preparation—Fluidextractum Sarsaparillæ Compositus.

Average dose—Metric, 10 Gm.—Apothecaries, 2½ drachms.

SCAMMONIÆ RADIX

Scammony Root

Scam. Rad.

The dried root of *Convolvulus Scammonia* Linné (Fam. *Convolvulaceæ*), yielding not less than 8 per cent. of the total resins of Scammony Root.

Cylindrical or somewhat tapering, from 10 to 25 cm. in length and from 1 to 4.5 cm. in thickness; externally grayish- to reddish-brown; usually distinctly twisted, deeply longitudinally furrowed, marked by distinct root-scars, otherwise nearly smooth except for the lenticels and abraded cork, the upper portion terminated usually by a number of short stem branches; hard and heavy; fracture tough, irregular with projecting wood-fibers; internally somewhat mottled, showing yellowish, porous wood-wedges separated by whitish parenchyma containing starch and resin, bark thin; odor slight, resembling that of jalap; taste very slightly sweet, becoming slightly acrid.

Under the microscope, sections of Scammony Root show a corky layer consisting of from 2 to 10 rows of cells with thin, yellowish-brown lignified walls; an outer cortex with numerous stone cells occurring singly or in small groups, the walls being moderately thick, porous and not strongly lignified; parenchyma with numerous starch grains and monoclinic prisms of calcium oxalate; fibro-vascular bundles numerous, circular or elliptical with a well developed wood consisting of large tracheæ surrounded by slightly lignified wood-fibers; phloem or sieve prominent in which are included large resin ducts; the parenchyma, both in and surrounding the bundles, more or less collapsed and containing either starch or calcium oxalate crystals.

The powder is light grayish-brown; when examined under the microscope it exhibits starch grains from 0.003 to 0.018 mm. in diameter, mostly single, occasionally 2- to 4-compound, the grains showing occasionally a central cleft; calcium oxalate crystals numerous, in monoclinic prisms from 0.01 to 0.045 mm. in length; fragments of leptomes or sieve with accompanying yellowish-brown resin cells; tracheæ mostly with reticulate thickenings and simple or bordered pores and associated with short wood-fibers having prominent oblique pores; stone cells of variable shape and varying from 0.04 to 0.11 mm. in length, the walls being from 0.006 to 0.012 mm. in thickness, slightly lignified and traversed with prominent, often branching pores; lignified cork cells relatively few.

Assay—Proceed as directed under *Jalapa*, using 10 Gm. of Scammony Root in No. 60 powder.

Preparations—Extractum Colocynthidis Compositum (from Resin) Resina Scammoniæ.

Average dose—Metric, 0.25 Gm.—Apothecaries, 4 grains.

SCILLA

Squill

Scill.

The fleshy, inner scales of the bulb of the white variety of *Urginea maritima* (Linné) Baker (Fam. *Liliaceæ*), cut into pieces and carefully dried. Preserve Squill in tightly-closed containers, in a dry place. If made into the official tincture and assayed biologically, the minimum lethal dose should not be greater than 0.006 mil of tincture, or the equivalent in tincture of 0.0000005 Gm. of ouabain, for each gramme of body-weight of frog.

In irregular, more or less curved, somewhat flattened pieces, from 0.5 to 5 cm. in length, yellowish-white, somewhat translucent, nearly smooth and lustrous with slight projections of fibro-vascular bundles; brittle when dry and somewhat flexible when damp; odor slight; taste bitter and acrid.

Under the microscope, sections of the scales of Squill show on the upper and lower surface a thin-walled epidermal layer, a mesophyll of nearly isodiametric or slightly elongated thin-walled cells and occasionally show in alcoholic or glycerin mounts spheroidal aggregates of a carbohydrate; numerous more or less rectangular cells containing mucilage and bundles of raphides of calcium oxalate, the latter from 0.075 to 1.0 mm. in length; fibro-vascular bundles few and isolated, with spiral or reticulate tracheæ. Occasionally some of the parenchyma cells contain a few somewhat spherical starch grains.

The powder is light yellow, with a tendency to cake in moist atmosphere and consisting of very irregular fragments; when examined under the microscope it exhibits numerous single crystals and bundles of long raphides of calcium oxalate; fragments of thin-walled, colorless parenchyma, frequently with dark intercellular spaces due to the inclusion of air; fragments with spiral or reticulate tracheæ are occasionally found.

Squill yields not more than 8 per cent. of ash.

Assay—For a method for assaying Squill see Biological Assays (Part II).

Preparations—Acetum Scillæ Fluidextractum Scillæ Syrupus Scillæ (from Vinegar) Syrupus Scillæ Compositus (from Fluidextract) Tinctura Scillæ.

Average dose—Metric, 0.1 Gm.—Apothecaries, 1½ grains.

SCOPOLAMINÆ HYDROBROMIDUM

Scopolamine Hydrobromide

Scopolamin. Hydrobrom.—Hyoscine Hydrobromide Scopolamine Bromide

The hydrobromide [$C_{17}H_{21}O_4NHBr+3H_2O=438.15$] of lævorotatory scopolamine, also known as hyoscine, obtained from various plants of the *Solanaceæ*. Preserve it in well-closed containers, protected from light.

Scopolamine Hydrobromide occurs in colorless, transparent, rhombic crystals, sometimes of large size; odorless; slightly efflorescent.

Great caution must be used in tasting it, and then only in dilute solutions.

One Gm. of Scopolamine Hydrobromide dissolves in 1.5 mils of water and in 20 mils of alcohol at 25° C.; slightly soluble in chloroform; insoluble in ether.

Its aqueous solution (1 in 20) is neutral or at most only slightly acid to litmus.

When anhydrous it melts between 190° and 192° C.

The specific rotatory power of the salt, determined in an aqueous solution containing the equivalent of 5 Gm. of anhydrous Scopolamine Hydrobromide in 100 mils of solution at 25° C., is from $-22°$ to $-25.75°$ in a 100 mm. tube (see Part II, Test No. 21).

Add about 0.01 Gm. of the salt to 5 drops of nitric acid and evaporate it to dryness in a porcelain dish on a water bath; the residue yields a violet color upon the addition of alcoholic potassium hydroxide T.S. Silver nitrate T.S. produces in the aqueous solution of the salt a yellowish-white precipitate insoluble in nitric acid.

Shake 2 mils of chloroform with 1 mil of an aqueous solution of the salt (1 in 20) to which a few drops of chlorine water have been added; the chloroform assumes a brownish color.

When dried to constant weight at 100° C. it loses not more than 13 per cent. of its weight. It also loses its water of crystallization slowly over sulphuric acid.

No weighable ash remains on incinerating 0.1 Gm. of Scopolamine Hydrobromide.

The addition of a few drops of ammonia water T.S. to 1 mil of an aqueous solution of the salt (1 in 20) causes no turbidity; the addition of potassium hydroxide T.S. to another portion of 1 mil of the aqueous solution causes only a whitish, transient turbidity (*foreign alkaloids*).

Add 0.05 mil of tenth-normal potassium permanganate V.S. to 15 mils of an aqueous solution of the salt (1 in 100); the solution is not completely decolorized within five minutes (*apoatropine*).

The solution of about 0.1 Gm. of the salt in 1 mil of sulphuric acid is not more than faintly yellow (*carbonizable impurities*). Add a drop of nitric acid to this solution; an orange color is produced, due to the liberation of bromine, but no deep red color fading to orange is noticeable (*morphine*).

AVERAGE DOSE—Metric, 0.0003 Gm.—Apothecaries, 1/200 grain.

SENEGA

Senega

Seneg.—Seneca Snakeroot Senega Snakeroot

The dried roots of *Polygala Senega* Linné (Fam. *Polygalaceæ*), without the presence or admixture of more than 5 per cent. of stems and other foreign matter.

Usually in broken pieces; when entire slenderly conical, more or less tortuous, somewhat branched, from 3 to 15 cm. in length and from 2 to 10 mm. in thickness and bearing a few rootlets; crown knotty with numerous buds and short stem-bases; externally brownish-yellow, the crown rose-tinted, longitudinally wrinkled, frequently marked by a keel; fracture short, wood pale yellow, usually excentrically developed; odor peculiar, penetrating; taste sweetish, afterwards acrid.

Under the microscope, transverse sections of Senega usually show a characteristic excentric development of wood, the central cylinder varying in outline from elliptical or ovate to irregularly fan-shaped, and being surrounded by an unevenly developed cortex which is thickest next to the broadest strands of wood and where the wood-wedges are narrow and the medullary rays very broad, the cortical parenchyma occupies a very narrow zone of the cross-section; in older roots a corky layer of from 4 to 5 rows of tangentially elongated, light yellowish or yellowish-brown cells; outer bark of about 20 rows of cells on one side of the root and only 10 or less on the other, the cells having slightly thickened walls and containing a colorless or pale yellow, amorphous substance, which is liberated in the form of large globules on the addition of a drop of potassium hydroxide T.S.; inner bark, the cells in radial rows, consisting of parenchyma, small groups of sieve tissue and medullary rays, the latter from 1 to 3 cells wide; all the cells in this zone show a collenchymatous thickening of the walls and contain an amorphous substance similar to that found in cells of the outer bark; woody layer of tracheæ with bordered pores, wood-fibers with oblique simple pores, tracheids, and medullary rays, the latter being rather indistinct and resembling the wood-fibers; tissues of the central layer of wood colored yellowish- or reddish-brown on the addition of a drop of potassium hydroxide T.S.

The powder is yellowish-gray to light yellowish-brown, odor penetrating, slightly sternutatory; when examined under the microscope it exhibits a mixture of fragments of parenchyma containing oily globules and wood-fibers with tracheæ; wood-fibers, non-lignified and with oblique simple pores, from 0.175 to 0.25 mm. in length; tracheæ with simple and bordered pores and about 0.175 mm. in length; medullary ray cells somewhat lignified and with large simple pores.

Extract 10 Gm. of powdered Senega by means of a Soxhlet apparatus, using 50 mils of ether containing 2 drops of hydrochloric acid. Continue the extraction during four or five hours and then add sufficient ether to make the liquid measure 50 mils. Take 25 mils of this solution and evaporate it on a water bath to dryness; the residue weighs not less than 0.3 Gm., and upon dissolving it in 10 mils of chloroform, transferring the solution to a test tube and adding 5 mils of sulphuric acid to form an underlying layer, a reddish-brown color is produced at the zone of contact, and the sulphuric acid shows a slightly green fluorescence after the mixture has stood for twenty-four hours. Pour 10 mils of the original ethereal solution into a beaker containing 10 mils of water and warm the mixture on a water bath until the ether has evaporated; the aqueous solution, upon filtering and adding a few drops of ferric chloride T.S., becomes a bright pinkish purple.

Senega yields not more than 5 per cent. of ash.

Preparations—Fluidextractum Senegæ Syrupus Senegæ (from Fluidextract) Syrupus Scillæ Compositus (from Fluidextract).

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

SENNA

Senna

Senn.

The dried leaflets of *Cassia acutifolia* Delile, known in commerce as Alexandria Senna, or of *Cassia angustifolia* Vahl, known in commerce as India Senna (Fam. *Leguminosæ*), without the presence or admixture of more than 10 per cent. of stem tissues, pods, seeds and other impurities.

Alexandria Senna—Usually unbroken, occasionally in fragments, leaflets inequilaterally lanceolate or lance-ovate, from 2 to 3.5 cm. in length and from 6 to 10 mm. in breadth, having extremely short, stout petiolules; acutely cuspidate, entire, subcoriaceous, brittle, pale green or grayish-green, sparsely and obscurely hairy, especially beneath, the hairs appressed; odor characteristic, taste somewhat mucilaginous and bitter.

Pods few, broadly elliptical, somewhat reniform, dark green, thin and membranous.

India Senna—Leaflets usually unbroken, from 2 to 5 cm. in length and from 6 to 14 mm. in breadth, usually more abruptly pointed than those of Alexandria Senna, yellowish-green and smooth above, paler beneath; in odor and taste closely resembling Alexandria Senna.

Pods few, elliptical, more or less reniform and from 4 to 5 cm. in length.

Powdered Alexandria Senna is light green; when examined under the microscope it exhibits non-glandular hairs, 1-celled, conical, often curved, from 0.1 to 0.35 mm. in length, walls thick and papillose; calcium oxalate in rosette aggregates, from 0.009 to 0.01 mm. in diameter, and in 4- to 6-sided prisms, about 0.015 mm. in length, usually in crystal fibers; stomata broadly elliptical, about 0.02 mm. in long diameter. In India Senna the powder is slightly darker green than that of Alexandria Senna and the hairs are similar but relatively fewer.

Mix 0.5 Gm. of powdered Senna with 10 mils of an alcoholic solution of potassium hydroxide (1 in 10), boil the mixture for about two minutes, dilute it with 10 mils of water and filter. Now acidify the filtrate with hydrochloric acid, shake it with ether; remove the ethereal layer and shake it with 5 mils of ammonia water; the latter is colored pinkish-red or bluish-red.

Senna yields not more than 12 per cent. of ash. The yield of ash insoluble in hydrochloric acid is not more than 3 per cent. of the Senna taken.

Preparations—Fluidextractum Sennæ Infusum Sennæ Compositum Pulvis Glycyrrhizæ Compositus Syrupus Sarsaparillæ Compositus (from Fluidextract) Syrupus Sennæ (from Fluidextract).

AVERAGE DOSE—Metric, 4 Gm.—Apothecaries, 1 drachm.

SERPENTARIA

Serpentaria

Serpent.—Texas Snakeroot Virginia Snakeroot

The dried rhizome and roots of *Aristolochia Serpentaria* Linné, known in commerce as Virginia Snakeroot, or of *Aristolochia reticulata* Nuttall, known in commerce as Texas Snakeroot (Fam. *Aristolochiaceæ*), without the presence or admixture of more than 10 per cent. of the stems or other foreign matter.

Rhizome in both commercial varieties oblique, subcylindrical, more or less curved, from 10 to 30 mm. in length and from 1 to 2 mm. in diameter; externally dark brown, upper portion with short stem-bases and from lower and lateral portions arise numerous, long, thin, nearly straight, yellowish-brown roots; fracture short; internally yellowish-white, wood with broad, excentric wedges; odor terebinthinate; taste bitter, aromatic.

Under the microscope, transverse sections of the rhizome of both commercial varieties of Serpentaria show an outer layer of epidermal cells; a cortex of from 10 to 15 rows of parenchyma; inner bark sometimes showing strongly lignified bast-fibers, either single or distributed in a more or less interrupted circle; a xylem of broad wood-wedges separated by broad medullary rays about 8 cells wide, the walls being strongly lignified and with numerous simple pores; pith excentric, composed of polygonal cells, the walls being lignified and porous. Starch in the cells of cortical parenchyma, medullary rays and pith.

The root in transverse section shows a compact, 4- to 6-rayed stele, and a large starch-bearing cortical area.

The stem in transverse section shows an interrupted circle of from 6 to 10 fibro-vascular bundles, a cortex with a prominent continuous ring of strongly lignified cells, and a few non-glandular hairs.

The powder is grayish-brown; when examined under the microscope it exhibits numerous starch grains, single and 2- to 4-compound, the individual grains being more or less spherical or plano-convex and frequently with a central cleft, from 0.003 to 0.014 mm. in diameter; lignified elements numerous, consisting of tracheæ, wood-fibers, medullary ray cells and pith cells; a few non-glandular hairs of the stem are occasionally present.

Preparation—Tinctura Cinchonæ Composita.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

SERUM ANTIDIPHTHERICUM

Antidiphtheric Serum

Ser. Antidiph.—Diphtheria Antitoxin

A fluid, having a potency of not less than 250 antitoxic units per mil, separated from the coagulated blood of the horse, *Equus Caballus* Linné (Fam. *Equidæ*), or other large domestic animal, which has been properly immunized against diphtheria toxin. It must be kept in sealed glass containers in a dark place, at a temperature between 4.5° and 15° C.

A yellowish or yellowish-brown, transparent or slightly turbid liquid, with sometimes a slight granular deposit; nearly odorless, or having an odor due to the presence of an antiseptic used as a preservative.

Antidiphtheric Serum gradually loses in potency, the loss in one year varying between 10 per cent. and 30 per cent. The serum must come from healthy animals, must be sterile, must be free from toxins or other bacterial products, and must not contain an excessive amount of preservative (not more than 0.5 per cent. of phenol or cresol, when either of these is used), and the total solids must not exceed 20 per cent. Serum of a lower potency than 250 units per mil must not be sold or dispensed. Only such Sera may be sold or dispensed as have been prepared and propagated in establishments licensed by the Secretary of the Treasury of the United States.

The United States law requires that each container of Serum sold or dispensed by licensed establishments shall bear upon the label, in addition to the name of the Serum, the name, address and license number of the manufacturer, and the date beyond which the product cannot be expected to yield its specific results. The label must also contain the laboratory number of the Serum and the total number of antitoxic units claimed for the contents of the container.

The standard of strength, expressed in units of antitoxic power, shall be that established by the United States Public Health Service.

AVERAGE DOSE—Hypodermic, 10,000 units. Protective, 1000 units.

SERUM ANTIDIPHTHERICUM PURIFICATUM

Purified Antidiphtheric Serum

Ser. Antidiph. Purif.—Antidiphtheric Globulins Concentrated Diphtheria Antitoxin Diphtheric Antitoxin Globulins Refined and Concentrated Diphtheria Antitoxin

A solution in physiological solution of sodium chloride of certain antitoxic substances obtained from the blood serum or plasma of the horse, *Equus Caballus* Linné (Fam. *Equidæ*), or other large domestic animal, which has been properly immunized against diphtheria toxin. After the serum or plasma from the immunized animal has been collected the antitoxin-bearing globulins are separated from the other constituents of the serum or plasma and dissolved in water; and sufficient sodium chloride is then added to make a solution containing from 0.6 to 0.9 per cent. of the salt. It has a potency of not less than 250 antitoxic units per mil. It must be kept in sealed glass containers in a dark place, at a temperature between 4.5° and 15° C.

A transparent or slightly opalescent liquid, with sometimes a slight granular or ropy deposit, nearly odorless, or having an odor due to the presence of the antiseptic used as a preservative. The liquid is sometimes more or less viscous. The serum must come from healthy animals, must be sterile, must be free from toxins or other bacterial products, and must not contain an excessive amount of preservative (not more than 0.5 per cent. of phenol or cresol, when either of these is used), and the total solids must not exceed 20 per cent. Serum of a lower potency than 250 units per mil must not be sold or dispensed.

Purified Antidiphtheric Serum must comply with the requirements for loss of potency, control, labeling, and standard for potency under *Serum Antidiphthericum*.

AVERAGE DOSE—Hypodermic, 10,000 units. Protective, 1000 units.

SERUM ANTIDIPHTHERICUM SICCUM

Dried Antidiphtheric Serum

Ser. Antidiph. Sicc.—Dried Diphtheria Antitoxin

Dried Antidiphtheric Serum is obtained by the evaporation of either Antidiphtheric Serum or Purified Antidiphtheric Serum in a vacuum over sulphuric acid or other desiccating agent, or by passing over it a current of warm air freed from bacteria. It has a potency of not less than 4000 units per gramme. It must be kept in hermetically sealed, amber-colored glass containers free from air, at a temperature between 4.5° and 15° C., preferably in a dark place.

The Dried Serum is either in the form of orange or yellowish flakes or small lumps, or as a yellowish-white powder, without odor. The Serum is soluble in nine parts of distilled water, but the solution is opalescent and slightly viscous; it may be dissolved more readily in larger amounts of distilled water or physiological solution of sodium chloride. Immediately before use the Serum must be dissolved in recently boiled and cooled distilled water under the most rigid aseptic conditions. The solution must be used immediately and if there should be any serum or solution remaining, it must be discarded. Dried Antidiphtheric Serum if kept as directed does not lose in potency, as does the liquid serum.

It must comply with the requirements for control and labeling under *Serum Antidiphthericum* and the standard of strength, expressed in units of antitoxic power, shall be that established by the United States Public Health Service.

AVERAGE DOSE—Hypodermic, 10,000 units. Protective, 1000 units.

SERUM ANTITETANICUM

Antitetanic Serum

Ser. Antitetan.—Tetanus Antitoxin

A fluid, having a potency of not less than 100 units per mil, separated from the coagulated blood of the horse, *Equus Caballus* Linné (Fam. *Equidæ*), or other large domestic animal, which has been properly immunized against tetanus toxin. It must be kept in sealed glass containers in a dark place, at a temperature between 4.5° and 15° C.

A yellowish or yellowish-brown, transparent, or slightly turbid liquid with sometimes a slight granular deposit; nearly odorless, or having an odor due to the presence of the antiseptic used as a preservative.

Antitetanic Serum gradually loses in potency, the loss being greater at higher than at lower temperatures. The Serum must come from healthy animals, must be sterile, must be free from toxins or other bacterial products, and must not contain an excessive amount of preservative (not more than 0.5 per cent. of phenol or cresol, when either of these is used), and the total solids must not exceed 20 per cent. Serum of a lower potency than 100 units per mil must not be sold or dispensed. Only such Sera may be sold or dispensed as have been prepared and propagated in establishments licensed by the Secretary of the Treasury of the United States.

The United States law requires that each container of Serum sold or dispensed by licensed establishments shall bear upon the label, in addition to the name of the Serum, the name, address and license number of the manufacturer and the date beyond which the contents cannot be expected to yield its specific results. The label must also contain the laboratory number of the Serum and the total number of antitoxic units claimed for the contents of the container.

The standard of strength, expressed in units of antitoxic power, shall be that established by the United States Public Health Service.

AVERAGE DOSE—Hypodermic, 10,000 units. Protective, 1500 units.

SERUM ANTITETANICUM PURIFICATUM

Purified Antitetanic Serum

Ser. Antitetan. Purif.—Antitetanic Globulins Concentrated Tetanus Antitoxin
Refined and Concentrated Tetanus Antitoxin Tetanus Antitoxin Globulins

A solution in physiological solution of sodium chloride of certain antitoxic substances obtained from the blood serum or plasma of the horse, *Equus Caballus* Linné (Fam. *Equidæ*), or other large domestic animal, which has been properly immunized against tetanus toxin. After the serum or plasma from the immunized animal has been collected, the antitoxin-bearing globulins are separated from the other constituents of the serum or plasma and dissolved in water; and sufficient sodium chloride is then added to make a solution containing from 0.6 to 0.9 per cent. of the salt. It has a potency of not less than 100 units per mil. It must be kept in sealed glass containers in a dark place, at a temperature between 4.5° and 15° C.

A transparent or slightly opalescent liquid, with sometimes a slight granular or ropy deposit; nearly odorless, or having an odor due to the presence of the antiseptic used as a preservative. The liquid is sometimes more or less viscous. The serum must come from healthy animals, must be sterile, must be free from toxins or other bacterial products, and must not contain an excessive amount of preservative (not more than 0.5 per cent. of phenol or of cresol, when either of these is used), and the total solids must not exceed 20 per cent. Serum of a lower potency than 100 units per mil must not be sold or dispensed.

Purified Antitetanic Serum must comply with the requirements for loss of potency, control, labeling and standard for potency under *Serum Antitetanicum.*

Average dose—Hypodermic, 10,000 units. Protective, 1500 units.

SERUM ANTITETANICUM SICCUM

Dried Antitetanic Serum

Ser. Antitetan. Sicc.—Dried Tetanus Antitoxin

Dried Antitetanic Serum is obtained by the evaporation of either Antitetanic Serum or Purified Antitetanic Serum in a vacuum, over sulphuric acid or other desiccating agent, or by passing over it a current of warm air freed from bacteria. It has a potency of not less than 1000 units per gramme. It must be kept in hermetically sealed amber-colored glass containers, free from air, at a temperature between 4.5° and 15° C., preferably in a dark place.

Dried Antitetanic Serum is either in the form of orange or yellowish flakes or small lumps, or a yellowish-white powder, without odor. The serum is soluble in nine parts of distilled water, but the solution is opalescent and slightly viscous; it may be dissolved more readily in larger amounts of distilled water or physiological solution of sodium chloride. For use, the serum must be dissolved in recently boiled and cooled distilled water under the most rigid aseptic conditions. The solution must be used immediately and, if there should be any serum or solution remaining, it must be discarded. Dried Antitetanic Serum if kept as directed does not lose in potency, as does the liquid serum. It is sometimes used as a dusting powder or for local application to infected wounds.

It must comply with the requirements for control and labeling under *Serum Antitetanicum* and the standard of strength, expressed in units of antitoxic power, shall be that established by the United States Public Health Service.

Average dose—Hypodermic, 10,000 units. Protective, 1500 units.

SEVUM PRÆPARATUM

Prepared Suet

Sev. Præp.—Mutton Suet

The internal fat of the abdomen of the sheep (*Ovis aries* Linné, Fam. *Bovidæ*), purified by melting and straining. Preserve Prepared Suet in well-closed vessels impervious to fat. It must not be used after it has become rancid.

A white, solid fat, nearly inodorous, and having a bland taste when fresh, but becoming rancid on prolonged exposure to the air.

It is insoluble in water or cold alcohol; it dissolves in 44 parts of boiling alcohol, in about 60 parts of ether, and slowly dissolves in 2 parts of purified petroleum benzin. From its solution in the latter, when allowed to stand in a stoppered flask, it slowly separates in a crystalline form.

An alcoholic solution of Prepared Suet is neutral or slightly acid to litmus paper moistened with alcohol.

Prepared Suet melts between 45° and 50° C. and congeals between 37° and 40° C.

One Gm. of Prepared Suet, dissolved in 50 mils of hot alcohol, and a few drops of phenolphthalein T.S. added, requires not more than 0.6 mil of tenth-normal potassium hydroxide V.S. to produce a pink color (*free acid*).

Saponification value: not less than 193 nor more than 200 (see Part II, Test No. 9).

Iodine value: not less than 33 nor more than 48 (see Part II, Test No. 8).

SINAPIS ALBA

White Mustard

Sinap. Alb.—Yellow Mustard

The ripe seeds of *Sinapis alba* Linné (Fam. *Cruciferæ*), without the presence or admixture of more than 5 per cent. of other seeds or other foreign matter. Preserve powdered White Mustard in tightly-closed containers.

Sub-globular, from 1.5 to 2.5 mm. in diameter; testa yellowish, nearly smooth; embryo yellowish, oily, with two large cotyledons; inodorous, taste mildly pungent, acrid.

The powder is light yellowish or pale brownish-yellow, developing a slight odor when moistened; when examined under the microscope it exhibits numerous tissues of the embryo containing small aleurone grains and a fixed oil, the latter forming in large globules on the addition of hydrated chloral T.S.; fragments of seed-coat comparatively few, nearly colorless, with small, characteristic stone cells and large epidermal cells, the outer walls being mucilaginous. The powder contains few or no starch grains.

White Mustard does not yield allyl isothiocyanate upon distillation with steam (distinction from *Black Mustard*).

White Mustard yields not more than 9 per cent. of ash.

AVERAGE DOSE—Emetic, Metric, 10 Gm.—Apothecaries, 2½ drachms.

SINAPIS NIGRA

Black Mustard

Sinap. Nig.—Brown Mustard

The ripe seeds of *Brassica nigra* (Linné) Koch (Fam. *Cruciferæ*), without the presence or admixture of more than 5 per cent. of other seeds or other foreign matter. Preserve powdered Black Mustard in tightly-closed containers.

Ellipsoidal or irregularly spheroidal, from 1 to 1.6 mm. in diameter; testa deep reddish-brown, sometimes yellowish-brown and with a grayish tinge, minutely pitted or reticulate; embryo greenish-yellow or dark yellow, oily, with two large cotyledons; odor when dry, slight, on moistening very irritating; taste strongly pungent and acrid.

The powder is light brown or greenish-brown; on moistening developing a strongly pungent, irritating, characteristic odor; when examined under the microscope it exhibits numerous tissues of the embryo, the cells containing small aleurone grains and a fixed oil, the latter forming in large globules on the addition of hydrated chloral T.S.; fragments of seed-coat conspicuous, with large, polyhedral, dark yellow areas, enclosing small, yellowish stone cells, each of the latter with a dark lumen. The powder contains few or no starch grains.

Black Mustard, upon distillation with steam, yields allyl isothiocyanate (distinction from *White Mustard*).

Black Mustard yields not more than 9 per cent. of ash.

Average dose—Emetic, Metric, 10 Gm.—Apothecaries, 2½ drachms.

SODII ACETAS

Sodium Acetate

Sod. Acet.

It contains not less than 59.97 per cent. nor more than 62.96 per cent. of anhydrous sodium acetate, corresponding to not less than 99.5 per cent. of the crystallized salt [$NaC_2H_3O_2+3H_2O=136.07$]. Preserve it in well-closed containers.

Sodium Acetate occurs as colorless, transparent, monoclinic prisms, or as a granular, crystalline powder; odorless, or having a faint, acetous odor. It has a cooling, saline taste. Efflorescent in warm, dry air.

One Gm. of Sodium Acetate dissolves in 0.8 mil of water and in 19 mils of alcohol at 25° C.

An aqueous solution of the salt (1 in 20) is neutral or slightly alkaline to litmus or phenolphthalein T.S.

When heated to about 58° C., the salt begins to liquefy. At about 120° C., it becomes anhydrous; at a higher temperature it is decomposed, with the evolution of inflammable, empyreumatic vapors, leaving a black residue of sodium carbonate and carbon, which imparts to a non-luminous flame an intensely yellow color, shows an alkaline reaction with litmus, and effervesces with acids.

Add 0.1 Gm. of the salt to 1 mil of sulphuric acid and 1 mil of alcohol and warm; ethyl acetate is formed, recognizable by its odor.

A saturated aqueous solution of the salt is not rendered turbid by the addition of sodium bitartrate T.S. (*potassium*).

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

An aqueous solution of the salt meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Assay—Proceed as directed under the Assay for alkali salts of organic acids (see Part II, Test No. 6). It shows not less than 59.97 per cent. nor more than 62.96 per cent. of $NaC_2H_3O_2$.

Each mil of half-normal sulphuric acid V.S. used corresponds to 0.04101 Gm. of $NaC_2H_3O_2$. Each gramme of Sodium Acetate corresponds to not less than 14.62 mils nor more than 15.35 mils of half-normal sulphuric acid V.S.

Average dose—Metric, 1 Gm.—Apothecaries, 15 grains.

SODII ARSENAS

Sodium Arsenate

Sod. Arsen.—Arsenas sodii **P.I.**

It contains not less than 58.98 per cent. nor more than 61.92 per cent. of anhydrous sodium arsenate (di-sodium ortho-arsenate), corresponding to not less than 99 per cent. of the crystallized salt [$Na_2HAsO_4+7H_2O=312.08$]. Preserve it in well-closed containers.

Sodium Arsenate occurs as colorless, transparent, monoclinic prisms; odorless. Efflorescent in dry air, and somewhat deliquescent in moist air. *Great caution must be used in tasting it and then only in very dilute solutions.*

One Gm. of Sodium Arsenate dissolves in 1.5 mils of water at 25° C.; also in about 1 mil of boiling water; slightly soluble in alcohol at 25° C.; nearly insoluble in boiling alcohol.

When gently heated, the salt loses five molecules of water, and is converted into a white powder. At a higher temperature it loses all of its water of crystallization; when strongly heated, the salt fuses, and at a red heat it is converted into pyroarsenate.

Sodium Arsenate responds to the tests for identity and purity prescribed under *Sodii Arsenas Exsiccatus* when taken in proportionate amount.

Assay—Dissolve about 0.5 Gm. of Sodium Arsenate, accurately weighed, in 25 mils of distilled water, heat the solution to 80° C. and add 10 mils of hydrochloric acid and 3 Gm. of potassium iodide. Allow the mixture to stand for fifteen minutes at 80° C., then cool and titrate it with tenth-normal sodium thiosulphate V.S., starch T.S. being used as indicator. It shows not less than 58.98 per cent. nor more than 61.92 per cent. of Na_2HAsO_4.

Each mil of tenth-normal sodium thiosulphate V.S. used corresponds to 0.0092985 Gm. of Na_2HAsO_4. Each gramme of Sodium Arsenate corresponds to not less than 63.44 mils nor more than 66.59 mils of tenth-normal sodium thiosulphate V.S.

Preparation—Sodii Arsenas Exsiccatus.

AVERAGE DOSE—Metric, 0.005 Gm.—Apothecaries, 1/12 grain.

SODII ARSENAS EXSICCATUS

Exsiccated Sodium Arsenate

Sod. Arsen. Exsic.

It contains, when dried to constant weight at 150° C., not less than 98 per cent of Na_2HAsO_4 (185.97). Preserve it in well-closed containers.

SODIUM ARSENATE, in crystals, *a sufficient quantity.*

Break the crystals into small fragments, and allow them to effloresce at a temperature between 40° and 50° C. until they are completely disintegrated; then gradually increase the temperature to 150° C. and continue the drying until the product ceases to lose weight. Reduce it to a fine powder, and transfer it to dry, well-closed containers.

Exsiccated Sodium Arsenate occurs as an odorless, amorphous, white powder. It is slightly hygroscopic. *Great caution must be used in tasting it and then only in very dilute solutions.*

One Gm. of Exsiccated Sodium Arsenate dissolves in 3.1 mils of water at 25° C.; also in about 1.3 mils of boiling water; slightly soluble in alcohol at 25° C.; nearly insoluble in boiling alcohol.

Its aqueous solution (1 in 20) is alkaline to litmus.

It imparts an intensely yellow color to a non-luminous flame.

An aqueous solution of the salt (1 in 20) yields a white precipitate with barium chloride T.S., and a dark red precipitate with silver nitrate T.S.; both of these precipitates are soluble in nitric acid.

Add 5 mils of tenth-normal silver nitrate V.S. to 2 mils of an aqueous solution of the salt (1 in 20) and redissolve the precipitate with the aid of a slight excess of ammonia water; no black precipitate of reduced silver appears on boiling for one minute (*arsenite*).

Add 1 mil of ammonium sulphide T.S. to 5 mils of an aqueous solution of the salt (1 in 100); no dark coloration appears (*lead, copper, or iron*).

Assay—Dissolve about 0.3 Gm. of Exsiccated Sodium Arsenate, dried to constant weight at 150° C. and accurately weighed, in 25 mils of distilled water, in a glass-stoppered bottle, heat the solution to 80° C. and add 10 mils of hydrochloric acid and 3 Gm. of potassium iodide. Allow the mixture to stand in the stoppered bottle for fifteen minutes at 80° C., then cool and titrate it with tenth-normal sodium thiosulphate V.S., starch T.S. being used as indicator. It shows, in the dried salt, not less than 98 per cent. of Na_2HAsO_4.

Each mil of tenth-normal sodium thiosulphate V.S. used corresponds to 0.0092985 Gm. of Na_2HAsO_4. Each gramme of Exsiccated Sodium Arsenate, previously dried, corresponds to not less than 105.4 mils of tenth-normal sodium thiosulphate V.S.

Preparation—Liquor Sodii Arsenatis.

AVERAGE DOSE—Metric, 0.003 Gm.—Apothecaries, 1/20 grain.

SODII BENZOAS

Sodium Benzoate

Sod. Benz.

It contains, when dried to constant weight at 110° C., not less than 99 per cent. of $NaC_7H_5O_2$ (144.04). Preserve it in well-closed containers.

Sodium Benzoate occurs as a white, amorphous, granular or crystalline powder; odorless, and having a sweetish taste. It is permanent in the air.

One Gm. of Sodium Benzoate dissolves in 1.8 mils of water and in 61 mils of alcohol at 25° C.; also in 1.4 mils of boiling water.

An aqueous solution of Sodium Benzoate (1 in 20) is neutral or slightly alkaline to litmus.

When heated, the salt melts, emits vapors having the odor of benzoic acid, then chars, and finally leaves a residue of sodium carbonate and carbon. To a non-luminous flame it imparts an intensely yellow color.

Add a few drops of ferric chloride T.S. to an aqueous solution of the salt (1 in 20); a flesh-colored precipitate is deposited.

Diluted hydrochloric or sulphuric acid produces in a concentrated aqueous solution of the salt a voluminous white precipitate of benzoic acid.

Acidulate 10 mils of an aqueous solution of the salt (1 in 50) with hydrochloric acid and filter; the filtrate does not respond to the Test for heavy metals (see Part II, Test No. 3).

Assay—Dry the salt to constant weight at 110° C. and proceed as directed under the Assay for alkali salts of organic acids (see Part II, Test No. 6). It shows, in the dried salt, not less than 99 per cent. of $NaC_7H_5O_2$.

Each mil of half-normal sulphuric acid V.S. used corresponds to 0.07202 Gm. of $NaC_7H_5O_2$. Each gramme of Sodium Benzoate, previously dried, corresponds to not less than 13.75 mils of half-normal sulphuric acid V.S.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

SODII BENZOSULPHINIDUM

Sodium Benzosulphinide

Sod. Benzosulphin.—Sodium-Saccharin Soluble Saccharin

The sodium salt $[NaC_7H_4O_3NS+2H_2O=241.14]$ of benzosulphinide. Preserve it in well-closed containers.

Sodium Benzosulphinide occurs in colorless, rhombic prisms or as a white, crystalline powder; odorless or having a faint aromatic odor and an intensely sweet taste, even in dilute solutions; somewhat efflorescent.

One Gm. of Sodium Benzosulphinide dissolves in 1.2 mils of water, and in about 50 mils of alcohol at 25° C.

An aqueous solution of the salt (1 in 10) is neutral or only slightly alkaline to litmus, but produces no red color with phenolphthalein T.S.

On incineration the salt leaves a residue consisting chiefly of sodium sulphate.

Mix 10 mils of an aqueous solution of the salt (1 in 10) with 1 mil of hydrochloric acid; a crystalline precipitate of benzosulphinide is produced.

Add a few drops of ferric chloride T.S. to 10 mils of an aqueous solution of the salt (1 in 20) previously acidulated with from 3 to 5 drops of acetic acid; no pink or violet precipitate is produced (*benzoate or salicylate*).

In other respects it responds to the tests for identity and purity under *Benzosulphinidum*, omitting the melting point and the tests for ash, benzoic acid or salicylic acid.

AVERAGE DOSE—Metric, 0.2 Gm.—Apothecaries, 3 grains.

SODII BICARBONAS

Sodium Bicarbonate

Sod. Bicarb.

It contains, when dried to constant weight in a desiccator over sulphuric acid, not less than 99 per cent. of $NaHCO_3$ (84.01). Preserve it in well-closed containers, in a cool place.

Sodium Bicarbonate is a white, opaque powder; odorless, and having a cooling, mildly alkaline taste. It is permanent in dry air, but slowly decomposed in moist air.

One Gm. of Sodium Bicarbonate dissolves in 10 mils of water at 25° C.; insoluble in alcohol.

An aqueous solution of Sodium Bicarbonate (1 in 20) when freshly prepared with cold distilled water, without shaking, is slightly alkaline to litmus. The alkalinity increases by standing, agitation, or increase in temperature.

When heated above 15° C., an aqueous solution of the salt gradually loses carbon dioxide, and at boiling temperature the salt is entirely converted into normal sodium carbonate.

When heated, the salt is decomposed into normal sodium carbonate, water, and carbon dioxide, and at 100° C., the loss is about 36.5 per cent. of its weight. At a bright red heat the residue fuses. To a non-luminous flame it imparts an intensely yellow color.

An aqueous solution of the salt effervesces strongly with acids.

No odor of ammonia is evolved on heating Sodium Bicarbonate in a test tube.

Dissolve 1 Gm. of the salt in 20 mils of distilled water at 25° C.; it yields a clear and colorless solution, leaving no residue.

Dissolve 1 Gm. of the salt without agitation in 20 mils of distilled water at a temperature not exceeding 15° C., and add 0.2 mil of normal hydrochloric acid and 2 drops of phenolphthalein T.S.; a red tint does not appear immediately (*carbonate*).

An aqueous solution of the salt (1 in 50), mixed with a slight excess of hydrochloric acid, does not respond to the Test for heavy metals (see Part II, Test No. 3).

Assay—Mix about 3 Gm. of Sodium Bicarbonate, previously dried to constant weight in a desiccator over sulphuric acid and accurately weighed, with 25 mils of distilled water and titrate with normal sulphuric acid V.S., methyl orange T.S. being used as indicator. It shows, in the dried salt, not less than 99 per cent. of $NaHCO_3$.

Each mil of normal sulphuric acid V.S. used corresponds to 0.08401 Gm. of $NaHCO_3$. Each gramme of Sodium Bicarbonate, previously dried, corresponds to not less than 11.78 mils of normal sulphuric acid V.S.

Preparation—Trochisci Sodii Bicarbonatis.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

SODII BORAS

Sodium Borate

Sod. Bor.—Borax Sodium Tetraborate Sodium Pyroborate

It contains not less than 52.32 per cent. nor more than 54.92 per cent. of anhydrous sodium borate (sodium biborate or tetraborate), corresponding to not less than 99 per cent. of the crystallized salt $[Na_2B_4O_7 + 10H_2O = 382.16]$. Preserve it in well-closed containers.

Sodium Borate occurs as colorless, transparent, monoclinic prisms, or as a white powder; odorless, and having a sweetish, alkaline taste. It is slightly efflorescent in warm, dry air.

One Gm. of Sodium Borate dissolves in 15 mils of water, and in about 1 mil of glycerin at 25° C.; also in 0.6 mil of boiling water; insoluble in alcohol.

An aqueous solution of the salt (1 in 20) is alkaline to litmus and turns turmeric paper reddish-brown. If the solution has been acidulated with hydrochloric acid, turmeric paper remains unchanged at first, but on drying becomes brownish-red, and this color is temporarily changed to greenish-black by moistening with ammonia water.

When heated, the salt at first loses part of its water of crystallization, then melts, and, when further heated, swells and forms a white porous mass.

At a red heat it loses all of its water of crystallization and fuses to a colorless glassy mass. To a non-luminous flame it imparts an intensely yellow color.

Form a bead of borax on a platinum wire, dip it in glycerin, and hold it in a non-luminous flame; a transient, bright green color appears.

An aqueous solution of the salt (1 in 20) does not effervesce with acids (*carbonate or bicarbonate*).

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

An aqueous solution of the salt meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Assay—Dissolve about 5 Gm. of Sodium Borate, accurately weighed, in 100 mils of distilled water and titrate the solution with normal hydrochloric acid V.S., methyl orange T.S. being used as indicator. It shows not less than 52.32 per cent. nor more than 54.92 per cent. of $Na_2B_4O_7$.

Each mil of normal hydrochloric acid V.S. used corresponds to 0.1010 Gm. of $Na_2B_4O_7$. Each gramme of Sodium Borate corresponds to not less than 5.18 mils nor more than 5.44 mils of normal hydrochloric acid V.S.

AVERAGE DOSE—Metric, 0.75 Gm.—Apothecaries, 12 grains.

SODII BROMIDUM

Sodium Bromide

Sod. Brom.

It contains, when dried to constant weight at 100° C., not less than 98.5 per cent. of NaBr (102.92). Preserve it in well-closed containers.

Sodium Bromide occurs as colorless or white, cubical crystals, or as a white, granular powder; odorless, and having a saline taste. The salt absorbs moisture from the air without deliquescing.

One Gm. of Sodium Bromide dissolves in 1.1 mils of water and in 16 mils of alcohol at 25° C.

An aqueous solution of the salt (1 in 20) is neutral or faintly alkaline to litmus.

When heated to a bright red heat, the salt fuses without decomposition, and at a somewhat higher temperature it volatilizes. To a non-luminous flame it imparts an intensely yellow color.

Silver nitrate T.S., added to an aqueous solution of the salt (1 in 10), produces a yellowish-white precipitate, insoluble in nitric acid or in a moderate excess of ammonia water.

Dissolve 1 Gm. of the salt in 10 mils of distilled water and add 0.1 mil of tenth-normal sulphuric acid V.S.; no color is produced by the subsequent addition of a drop of phenolphthalein T.S., even after boiling (*alkali*).

Add a few drops of ferric chloride T.S. and 1 mil of chloroform to 10 mils of an aqueous solution of the salt (1 in 20) and shake the mixture; the chloroform does not acquire a violet tint (*iodide*).

Drop 1 mil of diluted sulphuric acid on about 1 Gm. of the powdered salt; no yellow color appears at once (*bromate*).

Ten mils of an aqueous solution of the salt (1 in 20), when acidulated with hydrochloric acid, is not rendered turbid by the addition of 1 mil of potassium sulphate T.S. (*barium*); another 10 mil portion, acidulated with hydrochloric acid, is not rendered more than slightly turbid by barium chloride T.S. (*sulphate*).

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

Assay—Proceed as directed under the Assay for bromides (see Part II, Test No. 5), using about 0.4 Gm. of Sodium Bromide, dried to constant weight at 100° C. and accurately weighed. It shows, in the dried salt, not less than 98.5 per cent. of NaBr.

Each mil of tenth-normal silver nitrate V.S. used corresponds to 0.010292 Gm. of NaBr. Each gramme of Sodium Bromide, previously dried, corresponds to not less than 95.7 mils nor more than 98.3 mils of tenth-normal silver nitrate V.S.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

SODII CACODYLAS

Sodium Cacodylate

Sod. Cacodyl.

Sodium dimethylarsenate [$Na(CH_3)_2AsO_2 = 160.01$], with a somewhat variable amount of water of crystallization. It contains not less than 72 per cent. nor more than 75 per cent. of $Na(CH_3)_2AsO_2$. Preserve it in well-closed containers.

Sodium Cacodylate occurs as white, odorless, deliquescent prisms or as a granular powder.

One Gm. of Sodium Cacodylate dissolves in about 0.5 mil of water and in about 2.5 mils of alcohol at 25° C.

A solution of 2 Gm. of Sodium Cacodylate in 50 mils of distilled water requires not more than 0.5 mil of tenth-normal acid V.S. or tenth-normal alkali V.S. to render it neutral to phenolphthalein T.S.

It melts in its water of crystallization at about 60° C. and becomes anhydrous at 120° C. The salt burns with a bluish flame, emitting a garlic-like odor.

The salt imparts an intensely yellow color to a non-luminous flame.

A mixture of a few drops of an aqueous solution of the salt (1 in 100) with 2 mils of hypophosphorous acid, allowed to stand in a stoppered tube, develops the odor of cacodyl within one hour.

No turbidity is produced in 10 mils of an aqueous solution of the salt (1 in 20) by 1 mil of calcium chloride T.S., either in the cold or on heating (*monomethylarsenate*). No turbidity is produced in 5 mils of an aqueous solution of the salt (1 in 20) by 2 mils of magnesia mixture T.S. within one hour (*arsenate or phosphate*).

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

Separate portions of an aqueous solution of the salt (1 in 50), acidulated with nitric acid, are not rendered turbid at once by silver nitrate T.S. (*chloride*) or by barium chloride T.S. (*sulphate*).

Assay—Dissolve about 2.5 Gm. of Sodium Cacodylate, accurately weighed, in distilled water, render the solution neutral to phenolphthalein T.S., if necessary, and then titrate with normal hydrochloric acid V.S., using methyl orange T.S. as indicator. It shows not less than 72 per cent. nor more than 75 per cent. of $Na(CH_3)_2AsO_2$.

Each mil of normal hydrochloric acid V.S. used corresponds to 0.1600 Gm. of $Na(CH_3)_2AsO_2$. Each gramme of Sodium Cacodylate corresponds to not less than 4.5 mils nor more than 4.7 mils of normal hydrochloric acid V.S.

AVERAGE DOSE—Metric, 0.06 Gm.—Apothecaries, 1 grain.

SODII CARBONAS MONOHYDRATUS

Monohydrated Sodium Carbonate

Sod. Carb. Monohyd.

It contains not less than 99.5 per cent. of $Na_2CO_3+H_2O$ (124.02). Preserve it in well-closed containers.

Monohydrated Sodium Carbonate is a white, crystalline, granular powder; odorless, and having a strongly alkaline taste. When exposed to the air, under ordinary conditions, it absorbs only a slight percentage of moisture; exposed to warm, dry air at or above 50° C., the salt effloresces, and at 100° C. it becomes anhydrous.

One Gm. of Monohydrated Sodium Carbonate dissolves in 3 mils of water, and in 7 mils of glycerin at 25° C.; also in 1.8 mils of boiling water; insoluble in alcohol.

An aqueous solution of the salt (1 in 10) is strongly alkaline to litmus and phenolphthalein T.S., and effervesces with acids.

An aqueous solution of the salt imparts an intensely yellow color to a non-luminous flame.

An aqueous solution of the salt (1 in 50), mixed with a slight excess of hydrochloric acid, does not respond to the Test for heavy metals (see Part II, Test No. 3).

Assay—Dissolve about 2.5 Gm. of Monohydrated Sodium Carbonate, accurately weighed, in about 25 mils of distilled water and titrate with normal sulphuric acid V.S., methyl orange T.S. being used as indicator. It shows not less than 99.5 per cent. of $Na_2CO_3+H_2O$.

Each mil of normal sulphuric acid V.S. used corresponds to 0.06201 Gm. of $Na_2CO_3+H_2O$. Each gramme of Monohydrated Sodium Carbonate corresponds to not less than 16.05 mils of normal sulphuric acid V.S.

Average dose—Metric, 0.25 Gm.—Apothecaries, 4 grains.

SODII CHLORIDUM

Sodium Chloride

Sod. Chlorid.

It contains, when dried to constant weight at 110° C., not less than 99 per cent. of NaCl (58.46). Preserve it in well-closed containers.

Sodium Chloride occurs as colorless, transparent, cubical crystals, or as a white, crystalline powder; odorless, and having a purely saline taste. It is usually slightly hygroscopic.

One Gm. of Sodium Chloride dissolves in 2.8 mils of water, and in 10 mils of glycerin at 25° C.; also in 2.7 mils of boiling water; slightly soluble in alcohol.

An aqueous solution of the salt (1 in 10) is neutral to litmus.

When heated the salt decrepitates. At a red heat it fuses, and at a white heat it is slowly volatilized and partly decomposed. To a non-luminous flame it imparts an intensely yellow color.

With silver nitrate T.S. an aqueous solution of the salt (1 in 20) yields a white, curdy precipitate, insoluble in nitric acid, but readily soluble in ammonia water.

An aqueous solution of Sodium Chloride does not respond to the Test for heavy metals (see Part II, Test No. 3).

Separate portions of 10 mils each of an aqueous solution of Sodium Chloride (1 in 100), after the addition of 1 mil of ammonia water, show no immediate turbidity upon the addition of ammonium oxalate T.S. (*calcium*) or of sodium phosphate T.S. (*magnesium*).

Digest 2 Gm. of the finely powdered salt for three hours with 25 mils of warm alcohol, cool the mixture and remove the undissolved salt by filtration. Evaporate the filtrate to dryness, dissolve the residue in 5 mils of distilled water, add 1 mil of chloroform, and cautiously introduce, drop by drop, with constant agitation, chlorine T.S. which has been diluted with twice its volume of distilled water. The chloroform does not acquire a violet, yellow, or orange color (*iodide or bromide*).

Assay—Proceed as directed under the Assay for chlorides (see Part II, Test No. 5), using about 0.25 Gm. of Sodium Chloride, dried to constant weight at 110° C. and accurately weighed. It shows, in the dried salt, not less than 99 per cent. of NaCl.

Each mil of tenth-normal silver nitrate V.S. corresponds to 0.005846 Gm. of NaCl. Each gramme of Sodium Chloride, previously dried, corresponds to not less than 169.3 mils of tenth-normal silver nitrate V.S.

Preparation—Liquor Sodii Chloridi Physiologicus.

Average dose—Metric, 15 Gm.—Apothecaries, 4 drachms.

SODII CITRAS

Sodium Citrate

Sod. Cit.

It contains not less than 98 per cent. of $Na_3C_6H_5O_7+2H_2O$ (294.07). Preserve it in well-closed containers.

Sodium Citrate occurs in small crystals or as a white, granular powder; odorless, and having a cooling, saline taste.

One Gm. of Sodium Citrate dissolves in 1.3 mils of water at 25° C.; also in 0.6 mil of boiling water; insoluble in alcohol.

An aqueous solution of Sodium Citrate (1 in 20) is slightly alkaline to litmus but is not reddened by 1 drop of phenolphthalein T.S.

When heated to about 150° C., the salt loses all of its water of crystallization; on ignition at a red heat, it carbonizes and emits inflammable gases which have a very pungent, acrid odor, and a residue remains which is alkaline to litmus and strongly effervesces with acids.

To a non-luminous flame, the salt imparts an intensely yellow color.

Mix 10 mils of an aqueous solution of the salt (1 in 20) with 10 mils of calcium chloride T.S.; the liquid remains clear until it is boiled, when a white, granular precipitate is produced.

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

An aqueous solution of the salt meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Assay—Proceed as directed under the Assay for alkali salts of organic acids (see Part II, Test No. 6). It shows not less than 98 per cent. of $Na_3C_6H_5O_7+2H_2O$. Each mil of half-normal sulphuric acid V.S. used corresponds to 0.04901 Gm. of $Na_3C_6H_5O_7+2H_2O$. Each gramme of Sodium Citrate corresponds to not less than 20 mils of half-normal sulphuric acid V.S.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

SODII CYANIDUM

Sodium Cyanide

Sod. Cyanid.

It contains not less than 95 per cent. of NaCN (49.01). Preserve it in well-closed containers, protected from light.

NOTE—Sodium Cyanide replaces potassium cyanide of the U.S.P. VIII.

Sodium Cyanide occurs in the form of white, opaque, amorphous pieces, or as a white, granular powder; odorless when perfectly dry; deliquescent in the air and exhaling the odor of hydrocyanic acid. *Great caution must be used in handling this salt.*

It is freely soluble in cold water.

An aqueous solution of the salt (1 in 20) is strongly alkaline to litmus, and emits the odor of hydrocyanic acid.

At a low red heat the salt fuses. To a non-luminous flame it imparts an intensely yellow color.

A few drops of a solution of the salt (1 in 20) yield with silver nitrate T.S. a white precipitate, which is soluble in an excess of the solution of Sodium Cyanide, and in ammonia water.

Shake 5 mils of a solution of the salt (1 in 20) with a few drops each of ferrous sulphate T.S. and of ferric chloride T.S., and then add a slight excess of hydrochloric acid; a blue precipitate (iron ferrocyanide) is produced.

In 5 mils of an aqueous solution of the salt (1 in 10) a drop of ferric chloride T.S. followed by 2 mils of diluted hydrochloric acid produces neither a dark blue color (*ferrocyanide*) nor a red color (*sulphocyanate*).

Assay—Dissolve about 0.45 Gm. of Sodium Cyanide, accurately weighed, in 25 mils of distilled water, add 4 mils of ammonia water, 3 drops of potassium iodide T.S. and titrate with tenth-normal silver nitrate V.S. to the production of a permanent precipitate. It shows not less than 95 per cent. of NaCN.

Each mil of tenth-normal silver nitrate V.S. used corresponds to 0.009802 Gm. of NaCN. Each gramme of Sodium Cyanide corresponds to not less than 96.9 mils of tenth-normal silver nitrate V.S.

SODII GLYCEROPHOSPHAS

Sodium Glycerophosphate

Sod. Glycerophos.—Sodium Glycerinophosphate

Hydrated Sodium Glycerophosphate containing not less than 68 per cent. of the anhydrous salt [$Na_2C_3H_7PO_6$ or $C_3H_5(OH)_2PO_4Na_2$ = 216.10].

Sodium Glycerophosphate occurs as white, monoclinic plates or scales, or as a white powder, having a saline taste; odorless.

It is very soluble in cold or hot water; nearly insoluble in alcohol.

An aqueous solution of the salt (1 in 20) is alkaline to litmus and to phenolphthalein T.S.

When strongly heated the salt is decomposed, evolving inflammable vapors, and at a red heat is converted into sodium pyrophosphate.

Dissolve 1 Gm. of Sodium Glycerophosphate in 10 mils of distilled water and add 3 drops of phenolphthalein T.S.; the red color produced is discharged by the addition of 1.5 mils of tenth-normal sulphuric acid V.S. (*free alkali*).

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

Add an equal volume of cold ammonium molybdate T.S. to 10 mils of an aqueous solution of the salt (1 in 20); no precipitate is formed within one hour (*phosphates*). On heating this mixture a yellow precipitate is formed.

Triturate 1 Gm. of the salt with 20 mils of dehydrated alcohol, filter the mixture, evaporate the filtrate on a water bath and dry the residue for one hour at a temperature not exceeding 70° C.; the weight of this residue does not exceed 0.01 Gm. (*alcohol-soluble impurities*).

Assay—Dissolve about 3 Gm. of the salt, accurately weighed, in 30 mils of distilled water and titrate with half-normal hydrochloric acid V.S., using methyl orange T.S. as indicator. It shows not less than 68 per cent. of $Na_2C_3H_7PO_6$.

Each mil of half-normal hydrochloric acid V.S. used corresponds to 0.10805 Gm. of $Na_2C_3H_7PO_6$. Each gramme of Sodium Glycerophosphate corresponds to not less than 6.29 mils of half-normal hydrochloric acid V.S.

AVERAGE DOSE—Metric, 0.25 Gm.—Apothecaries, 4 grains.

SODII HYDROXIDUM

Sodium Hydroxide

Sod. Hydrox.—Caustic Soda Sodium Hydrate

It contains not less than 90 per cent. of NaOH (40.01). Preserve it in well-closed containers. If bottles are used as containers they must be made of hard glass.

Sodium Hydroxide occurs as dry, white, or nearly white, fused masses, or sticks, hard and brittle, showing a crystalline fracture; odorless. *Great caution is necessary in using it*, as it rapidly destroys organic tissues. Exposed to the air, it deliquesces, absorbs carbon dioxide, and becomes covered with a coating of carbonate.

One Gm. of Sodium Hydroxide dissolves in 0.9 mil of water at 25° C.; also in about 0.3 mil of boiling water; very soluble in alcohol.

A solution of Sodium Hydroxide even when greatly diluted is strongly alkaline to litmus.

When introduced into a non-luminous flame, it imparts to it an intensely yellow color.

An aqueous solution of Sodium Hydroxide (1 in 20) is clear and colorless (*organic matter or insoluble impurities*), and, after being acidulated with acetic acid, it yields no precipitate on the addition of an excess of tartaric acid T.S., or upon the addition of a few drops of sodium cobaltic nitrite T.S. (*potassium*).

An aqueous solution of Sodium Hydroxide (1 in 50), slightly acidulated with hydrochloric acid, does not respond to the Test for heavy metals (see Part II, Test No. 3).

Assay—Dissolve in a 500 mil graduated flask about 10 Gm. of Sodium Hydroxide, accurately weighed in a glass-stoppered weighing-bottle, in 250 mils of distilled water, which has previously been boiled and cooled, and add 15 mils of barium chloride T.S. Fill the flask to the mark with distilled water, which has previously been boiled and cooled, and thoroughly agitate the liquid. Filter it through a dry filter into a dry flask (rejecting the first 20 mils) and titrate 100 mils of the clear filtrate with normal hydrochloric acid V.S., using phenolphthalein T.S. as indicator. It shows not less than 90 per cent. of NaOH.

Each mil of normal hydrochloric acid V.S. used corresponds to 0.04001 Gm. of NaOH. Each gramme of Sodium Hydroxide corresponds to not less than 22.5 mils of normal hydrochloric acid V.S.

Preparation—Liquor Sodii Hydroxidi.

SODII HYPOPHOSPHIS

Sodium Hypophosphite

Sod. Hypophos.

It contains not less than 98 per cent. of $NaPH_2O_2+H_2O$ (106.07). Preserve it in well-closed containers. Caution should be observed in dispensing Sodium Hypophosphite, as an explosion is liable to occur when it is triturated or heated with nitrates, chlorates or other oxidizing agents.

Sodium Hypophosphite occurs as small, colorless, transparent, rectangular plates of a pearly luster, or as a white, granular powder; odorless, and having a saline taste. It is deliquescent on exposure to moist air.

One Gm. of Sodium Hypophosphite dissolves in 1 mil of water at 25° C.; also in about 0.15 mil of boiling water; soluble in alcohol, slightly soluble in dehydrated alcohol, and freely soluble in glycerin at 25° C.; freely soluble in boiling alcohol.

An aqueous solution of Sodium Hypophosphite (1 in 20) is neutral or slightly alkaline to litmus.

When heated in a test tube, the salt at first loses its water of crystallization, and upon further heating is decomposed, evolving spontaneously inflammable hydrogen phosphide, which burns with a bright yellow flame. To a non-luminous flame the salt imparts an intensely yellow color.

When an aqueous solution of the salt (1 in 20), acidulated with hydrochloric acid, is added drop by drop with agitation to an excess of mercuric chloride T.S., a white precipitate of mercurous chloride is formed. Upon the further addition of the solution of Sodium Hypophosphite, the precipitate becomes gray from reduction to metallic mercury.

A solution of 1 Gm. of the salt in about 10 mils of distilled water requires not more than 1.5 mils of tenth-normal hydrochloric acid V.S. for neutralization, methyl orange T.S. being used as indicator.

Heat 5 mils of an aqueous solution of the salt (1 in 5) in a test tube with 0.5 mil of diluted hydrochloric acid on a water bath for thirty minutes; no offensive odor is developed.

Measure 5 mils of an aqueous solution of the salt (1 in 25) into a beaker containing 3 mils of nitric acid, diluted with about 10 mils of distilled water, and evaporate the mixture to dryness on a water bath; the residue meets the requirements of the Test for arsenic (see Part II, Test No. 1).

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

Add magnesia mixture T.S. to 10 mils of an aqueous solution of the salt (1 in 20), made alkaline with ammonia water; it is not affected within one minute (*phosphate*).

Assay—Dissolve about 1 Gm. of Sodium Hypophosphite, accurately weighed, in 10 mils of distilled water, add 10 mils of nitric acid and evaporate the solution to dryness on a water bath. Then add 5 mils of nitric acid and again evaporate to dryness on a water bath. Dissolve the residue in 20 mils of distilled water, add a drop of phenolphthalein T.S. and sufficient special potassium hydroxide T.S. (see Reagents) to produce a pink color, and then dilute to exactly 100 mils with distilled water. Transfer 10 mils of this solution to a 100 mil graduated flask, add 50 mils of tenth-normal silver nitrate V.S. and proceed from this point as directed in the assay under *Sodii Phosphas.* It shows, in the dried salt, not less than 98 per cent. of $NaPH_2O_2+H_2O$.

Each mil of tenth-normal silver nitrate V.S. used corresponds to 0.0035357 Gm. of $NaPH_2O_2+H_2O$. Each gramme of Sodium Hypophosphite corresponds to not less than 277.2 mils of tenth-normal silver nitrate V.S.

Preparation—Syrupus Hypophosphitum.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

SODII INDIGOTINDISULPHONAS

Sodium Indigotindisulphonate

Sod. Indigotin.—Indigo Carmine

Chiefly the sodium salt [$C_{16}H_8O_2N_2(SO_3Na)_2=466.22$] of indigotindisulphonic acid.

Sodium Indigotindisulphonate occurs as a blue powder or as a dark purple paste.

Before applying the following tests to the paste, deprive it of water by drying it to constant weight at 100° C.

When compressed, it acquires a coppery luster.

Sodium Indigotindisulphonate is sparingly soluble in water, yielding a dark blue solution; almost insoluble in alcohol.

The addition of nitric acid, bromine water, or chlorine water to an aqueous solution of the salt (1 in 200) discharges the blue color. The blue color is also discharged by warming this solution with sodium hydroxide and zinc dust or with stannous chloride T.S.

Dissolve 1 Gm. of Sodium Indigotindisulphonate, previously dried to constant weight at 100° C., in 200 mils of distilled water, filter the solution through counterbalanced filters, wash the filters and residue with distilled water until the washings cease to be colored blue, and dry at 100° C. The dry, insoluble residue remaining on the filter does not exceed 2 per cent.

Boil about 0.2 Gm. of Sodium Indigotindisulphonate for two minutes with 10 mils of distilled water, cool, and then triturate the solution with small portions of bromine water until the blue color disappears. On now adding a few drops of potassium iodide T.S. to the liquid, no blue color is produced (*starch or starch iodide*).

Add 15 mils of solution of hydrogen dioxide and 10 mils of sodium hydroxide T.S. to about 0.2 Gm. of the salt, shake the mixture until the blue color disappears, then evaporate the liquid to about 10 mils, cool, acidulate with hydrochloric acid, and add a few drops of ferrous sulphate T.S.; no blue color is produced (*iron ferricyanide or ferrocyanide*).

SODII IODIDUM

Sodium Iodide

Sod. Iod.

It contains, when dried to constant weight at 100° C., not less than 99 per cent. of NaI (149.92). It contains not more than 7 per cent. of moisture. Preserve it in well-closed containers.

Sodium Iodide occurs as colorless, cubical crystals, or as a white, crystalline powder; odorless, and having a saline taste. In moist air Sodium Iodide deliquesces, or at first cakes and then deliquesces, and frequently undergoes decomposition, assuming a brown tint.

One Gm. of Sodium Iodide dissolves in 0.55 mil of water, about 2 mils of alcohol, and in 1 mil of glycerin at 25° C.; also in 0.4 mil of boiling water.

An aqueous solution of Sodium Iodide (1 in 20) is neutral or slightly alkaline to litmus.

When strongly heated, the salt melts, and at a bright red heat it is slowly volatilized and partly decomposed. To a non-luminous flame it imparts an intensely yellow color.

Add 1 mil of ferric chloride T.S., diluted with an equal volume of distilled water, to 5 mils of an aqueous solution of the salt (1 in 20); and shake the mixture with 5 mils of chloroform; the latter acquires a violet color.

Dissolve 1 Gm. of the salt in 10 mils of distilled water, and add 0.15 mil of tenth-normal sulphuric acid V.S.; no red color is produced by the addition of a drop of phenolphthalein T.S. (*alkali*).

A solution of 1 Gm. of the salt in 1 mil of distilled water yields no precipitate with 1 mil of sodium bitartrate T.S. (*potassium*).

Dissolve 0.5 Gm. of the salt in 10 mils of distilled water, which has been previously boiled and cooled, and add 2 drops of diluted sulphuric acid (free from sulphurous or nitrous acid), no distinct, yellow color appears within half a minute (*iodate*), and no turbidity occurs (*thiosulphate*).

Add 5 mils of potassium hydroxide T.S. and about 0.2 Gm. of aluminum wire to a solution of 1 Gm. of Sodium Iodide, in 5 mils of distilled water contained in a test tube of about 40 mils capacity. Insert a pledget of purified cotton in the upper portion of the test tube, and place a piece of moistened red litmus paper over its mouth. On heating the tube and contents upon a water bath for fifteen minutes, no blue coloration of the paper is discernible (*nitrate or nitrite*).

Ten mils of an aqueous solution of the salt (1 in 20), acidulated with hydrochloric acid, is not rendered turbid by the addition of 1 mil of potassium sulphate T.S. (*barium*); another 10 mil portion of an aqueous solution (1 in 20), acidulated with hydrochloric acid, is not rendered more than slightly turbid by a few drops of barium chloride T.S. (*sulphate*).

Heat gently 5 mils of an aqueous solution of the salt (1 in 10) with 1 drop of ferrous sulphate T.S., 1 drop of ferric chloride T.S., and 0.5 mil of potassium hydroxide T.S.; no blue color appears after acidulating the mixture with hydrochloric acid (*cyanide*).

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

When dried to constant weight at 100° C., it loses not more than 7 per cent. of its weight (*moisture*).

Assay—Proceed as directed under the Assay for iodides (see Part II, Test No. 5), using about 0.5 Gm. of Sodium Iodide, previously dried to constant weight at 100° C. and accurately weighed. It shows, in the dried salt, not less than 99 per cent. of NaI.

Each mil of tenth-normal silver nitrate V.S. used corresponds to 0.014992 Gm. of NaI. Each gramme of Sodium Iodide, previously dried, corresponds to not less than 66 mils nor more than 67.7 mils of tenth-normal silver nitrate V.S.

AVERAGE DOSE—Metric, 0.3 Gm.—Apothecaries, 5 grains.

SODII NITRIS

Sodium Nitrite

Sod. Nitris

It contains, when dried to constant weight in a desiccator over sulphuric acid, not less than 95 per cent. of $NaNO_2$ (69.01). Preserve it in well-closed containers.

Sodium Nitrite occurs as white, or nearly white, opaque, fused masses, or sticks, as colorless, transparent, hexagonal crystals, or as a granular powder; odorless, and having a mild, saline taste.

When exposed to the air, the salt deliquesces and is gradually oxidized to sodium nitrate, and becomes unfit for use.

One Gm. of Sodium Nitrite dissolves in 1.5 mils of water at 25° C.; sparingly soluble in alcohol; very soluble in boiling water.

An aqueous solution of Sodium Nitrite (1 in 10) is slightly alkaline to litmus.

When heated the salt melts, and at a red heat is decomposed, yielding oxygen, nitrogen, nitrogen dioxide, and sodium oxide. To a non-luminous flame it imparts an intensely yellow color.

Mix 5 mils of an aqueous solution of the salt (1 in 10) with 5 drops of potassium iodide T.S. and add 5 drops of hydrochloric acid; iodine is liberated, and nitrogen dioxide gas escapes with effervescence.

Dissolve 0.5 Gm. of the salt in 25 mils of diluted hydrochloric acid, evaporate the solution to dryness and dissolve the residue in 25 mils of distilled water, adding a few drops of diluted hydrochloric acid; 10 mils of the resulting solution does not respond to the Test for heavy metals (see Part II, Test No. 3).

Assay—Dissolve about 1 Gm. of Sodium Nitrite, previously dried to constant weight in a desiccator over sulphuric acid and accurately weighed in a stoppered weighing-bottle, in sufficient distilled water to make 100 mils, and add 10 mils of this solution, from a pipette, to a solution consisting of 50 mils of tenth-normal potassium permanganate V.S., 100 mils of distilled water and 5 mils of sulphuric acid. In adding the sodium nitrite solution, immerse the tip of the pipette beneath the surface of the permanganate mixture. Warm the liquid to 40° C., allow it to stand for five minutes and then titrate with tenth-normal oxalic acid V.S. It shows, in the dried salt, not less than 95 per cent. of $NaNO_2$.

Each mil of tenth-normal potassium permanganate V.S. used corresponds to 0.0034505 Gm. of $NaNO_2$. Each gramme of Sodium Nitrite, previously dried, corresponds to not less than 275.3 mils of tenth-normal potassium permanganate V.S.

Average dose—Metric, 0.06 Gm.—Apothecaries, 1 grain.

SODII PERBORAS

Sodium Perborate

Sod. Perbor.

It contains not less than 9 per cent. of available oxygen, corresponding to about 86.5 per cent. of $NaBO_3+4H_2O$ (154.06). Preserve it in well-closed containers, in a cool place.

Sodium Perborate occurs as white, crystalline granules or as a powder; odorless, and having a saline taste. It is stable in cool and dry air, but is decomposed with the evolution of oxygen in warm or moist air.

Sodium Perborate is soluble in water.

A saturated aqueous solution of the salt is alkaline to litmus or phenolphthalein T.S. In aqueous solution the salt is decomposed into metaborate and hydrogen dioxide, the solution gradually evolving oxygen. Oxygen is evolved more rapidly if the solution is warmed.

The salt imparts an intensely yellow color to a non-luminous flame. Turmeric paper, if moistened with an aqueous solution of the salt which has been acidulated with hydrochloric acid, becomes brown in color, particularly on drying; on moistening the dried test paper with ammonia water, the color is changed to greenish-black.

Agitate a mixture of 1 mil of an aqueous solution of the salt (1 in 50), 1 mil of diluted sulphuric acid, a few drops of potassium dichromate T.S., and 2 mils of ether; the ether acquires a blue color.

Strongly heat 0.5 Gm. of the salt in a platinum crucible, and dissolve the residue in 25 mils of distilled water with the aid of a few drops of hydrochloric acid; 10 mils of the resulting solution does not respond to the Test for heavy metals (see Part II, Test No. 3).

Assay—Dissolve about 0.25 Gm. of the salt, accurately weighed, in a mixture of 50 mils of distilled water and 10 mils of diluted sulphuric acid and titrate the solution with tenth-normal potassium permanganate V.S. It shows not less than 9 per cent. of available oxygen.

Each mil of tenth-normal potassium permanganate V.S. used corresponds to 0.0008 Gm. of available oxygen. Each gramme of Sodium Perborate corresponds to not less than 112.5 mils of tenth-normal potassium permanganate V.S.

Average dose—Metric, 0.06 Gm.—Apothecaries, 1 grain.

SODII PHENOLSULPHONAS

Sodium Phenolsulphonate

Sod. Phenolsulph.—Sodium Sulphocarbolate

It contains not less than 83.64 per cent. nor more than 87.82 per cent. of anhydrous sodium phenolsulphonate (sodium paraphenolsulphonate), corresponding to not less than 99 per cent. of the crystallized salt [$NaC_6H_5O.SO_3+2H_2O=232.14$]. Preserve it in well-closed containers.

Sodium Phenolsulphonate occurs as colorless, transparent, rhombic prisms or crystalline granules; odorless, and having a cooling, saline, bitter taste. It is somewhat efflorescent in dry air.

One Gm. of Sodium Phenolsulphonate dissolves in 4.2 mils of water, 140 mils of alcohol and in about 5 mils of glycerin at 25° C.; also in 0.8 mil of boiling water and 13.5 mils of boiling alcohol.

An aqueous solution of Sodium Phenolsulphonate (1 in 10) is neutral to litmus.

When heated slightly above 100° C., the salt loses all of its water of crystallization and becomes white. At a higher temperature it chars, emits inflammable vapors having the odor of phenol, and finally leaves a residue consisting chiefly of sodium sulphate. To a non-luminous flame it imparts an intensely yellow color.

A diluted solution of the salt (1 in 100) is rendered pale violet by ferric chloride T.S., but remains clear; barium chloride T.S. leaves the solution of the original salt clear, but if the salt is ignited, and the residue dissolved in distilled water, the same reagent produces in the filtered solution a copious, white precipitate.

Add bromine T.S. to 10 mils of an aqueous solution of the salt (1 in 100); a permanent yellow color but neither turbidity nor precipitation is produced within two minutes (*phenol*).

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

Assay—Dissolve about 0.25 Gm. of Sodium Phenolsulphonate, accurately weighed, in 50 mils of distilled water, add 50 mils of tenth-normal bromine V.S. and 5 mils of hydrochloric acid. Allow the mixture to stand for fifteen minutes, then add 2 Gm. of potassium iodide dissolved in 5 mils of distilled water, and subject the solution to residual titration with tenth-normal sodium thiosulphate V.S., using starch T.S. as indicator. It shows not less than 83.64 per cent. nor more than 87.82 per cent. of $NaC_6H_5O_4S$.

Each mil of tenth-normal bromine V.S. used corresponds to 0.04903 Gm. of $NaC_6H_5O_4S$. Each gramme of Sodium Phenolsulphonate corresponds to not less than 170.6 mils nor more than 179.1 mils of tenth-normal bromine V.S.

AVERAGE DOSE—Metric, 0.25 Gm.—Apothecaries, 4 grains.

SODII PHOSPHAS

Sodium Phosphate

Sod. Phos.

It contains not less than 39.25 per cent. nor more than 44.00 per cent. of anhydrous sodium phosphate (di-sodium-ortho-phosphate), corresponding to not less than 99 per cent. of the crystallized salt [$Na_2HPO_4+12H_2O=358.24$]. Preserve it in well-closed containers, in a cool place.

Sodium Phosphate occurs as large, colorless, monoclinic prisms, or as a granular, crystalline salt; odorless, and having a cooling, saline taste. The crystals effloresce in the air.

One Gm. of Sodium Phosphate dissolves in 2.7 mils of water at 25° C.; insoluble in alcohol.

An aqueous solution of Sodium Phosphate (1 in 10) is alkaline to litmus and phenolphthalein T.S.

When heated to about 40° C., the salt fuses, yielding a colorless liquid; at 100° C. it loses all of its water of crystallization and at a red heat is converted into sodium pyrophosphate. It imparts an intensely yellow color to a non-luminous flame.

An aqueous solution of the salt (1 in 20) yields a white, crystalline precipitate with magnesia mixture T.S.

Not more than a slight turbidity appears on dissolving 1 Gm. of the salt in 20 mils of distilled water *(calcium or aluminum)*.

No effervescence occurs on the addition of hydrochloric or nitric acid to a solution of the salt *(carbonate)*.

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

An aqueous solution of the salt meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Add a few drops of silver nitrate T.S. to 10 mils of an aqueous solution of the salt (1 in 20), previously mixed with 5 mils of diluted nitric acid; not more than an opalescence is produced *(chloride)*.

Assay—Introduce about 0.4 Gm. of Sodium Phosphate, accurately weighed, into a 100 mil graduated flask, dissolve it in 10 mils of distilled water, add 50 mils of tenth-normal silver nitrate V.S. and agitate the mixture well. Then gradually add zinc oxide (see page 554) in small portions until the liquid is neutral to litmus. Then add distilled water to make 100 mils, agitate the mixture thoroughly, filter through a dry filter, rejecting the first 20 mils of filtrate, collect 50 mils of the subsequent filtrate, add 2 mils of nitric acid and 2 mils of ferric ammonium sulphate T.S., and titrate with tenth-normal potassium sulphocyanate V.S. to the production of a permanent red color. It shows not less than 39.25 per cent. nor more than 44 per cent. of Na_2HPO_4.

Each mil of tenth-normal silver nitrate V.S. used corresponds to 0.004735 Gm. of Na_2HPO_4. Each gramme of Sodium Phosphate corresponds to not less than 82.9 mils nor more than 92.9 mils of tenth-normal silver nitrate V.S.

Preparation—Sodii Phosphas Exsiccatus.

AVERAGE DOSE—Metric, 4 Gm.—Apothecaries, 1 drachm.

SODII PHOSPHAS EFFERVESCENS

Effervescent Sodium Phosphate

Sod. Phos. Eff.

EXSICCATED SODIUM PHOSPHATE, in fine powder, *two hundred grammes*	200 Gm.
SODIUM BICARBONATE, dried and powdered, *four hundred and seventy-seven grammes*	477 Gm.
TARTARIC ACID, dried and powdered, *two hundred and fifty-two grammes*	252 Gm.
CITRIC ACID, uneffloresced crystals, *one hundred and sixty-two grammes*	162 Gm.
To make about *one thousand grammes*	1000 Gm.

Powder the citric acid and mix it intimately with the exsiccated sodium phosphate and tartaric acid, then thoroughly incorporate the sodium bicarbonate.

Place the mixed powders on a plate of glass or in a suitable dish, in an oven heated to between 93° and 104° C. Manipulate the mixture carefully with a wooden spatula, and, when it has become moist, rub it through a No. 6 tinned-iron sieve, and dry the granules at a temperature not exceeding 54° C. Immediately transfer the salt to suitable containers and seal them tightly. Care must be taken to prevent the salt from coming in contact with air containing moisture.

AVERAGE DOSE—Metric, 10 Gm.—Apothecaries, 2½ drachms.

SODII PHOSPHAS EXSICCATUS

Exsiccated Sodium Phosphate

Sod. Phos. Exsic.

It contains, when dried to constant weight at 110° C., not less than 98 per cent. of Na_2HPO_4 (142.05). Preserve it in well-closed containers.

SODIUM PHOSPHATE, *a convenient quantity.*

Allow the crystals to effloresce for several days in warm air, at a temperature of from 25° to 30° C., then continue the drying in an oven, raising the temperature very gradually until 100° C. has been reached, and maintaining this temperature until the salt ceases to lose weight. Powder and sift the residue and transfer it to well-closed containers.

Exsiccated Sodium Phosphate is a white powder which absorbs moisture readily, and which, after allowance is made for the loss of water of crystallization, conforms to the reactions and tests under *Sodii Phosphas.*

One Gm. of Exsiccated Sodium Phosphate dissolves in 8.1 mils of water at 25° C.; also in 1.1 mils of boiling water; insoluble in alcohol.

Assay—Exsiccated Sodium Phosphate, when quantitatively estimated by the assay method under *Sodii Phosphas,* using about 0.15 Gm. of the salt, previously dried to constant weight at 110° C. and accurately weighed, shows, in the dried salt, not less than 98 per cent. of Na_2HPO_4.

Each mil of tenth-normal silver nitrate V.S. used corresponds to 0.004735 Gm. of Na_2HPO_4. Each gramme of Exsiccated Sodium Phosphate, previously dried, corresponds to not less than 207 mils of tenth-normal silver nitrate V.S.

Preparation—Sodii Phosphas Effervescens.

AVERAGE DOSE—Metric, 2 Gm.—Apothecaries, 30 grains.

SODII SALICYLAS

Sodium Salicylate

Sod. Salicyl.

It contains, when dried to constant weight at 100° C., not less than 99.5 per cent. of $NaC_7H_5O_3$ (160.04). Preserve it in well-closed containers, protected from heat and light.

Sodium Salicylate occurs as a white, micro-crystalline powder, or in scales, or as an amorphous powder; colorless or having not more than a faint pink tinge; odorless, or having a faint, characteristic odor and a sweet, saline taste.

One Gm. of Sodium Salicylate dissolves in 0.9 mil of water and in 9.2 mils of alcohol at 25° C.; very soluble in boiling water or in boiling alcohol; soluble in glycerin.

An aqueous solution of Sodium Salicylate (1 in 10) when freshly made is colorless or nearly colorless, and neutral or slightly acid to litmus.

When heated the salt is decomposed, giving off inflammable vapors and an odor of phenol, and finally leaving a residue of sodium carbonate and carbon. To a non-luminous flame it imparts an intensely yellow color.

Add a few drops of ferric chloride T.S. to an excess of a concentrated aqueous solution of Sodium Salicylate (1 in 4); a dark red color and a precipitate are produced. In a solution of the salt (1 in 100) a deep violet-blue color is produced.

Diluted hydrochloric acid or sulphuric acid produces a voluminous, white precipitate in a concentrated aqueous solution of the salt.

Add 1 mil of hydrochloric acid to a solution of 1 Gm. of Sodium Salicylate in 20 mils of distilled water and filter the liquid; the filtrate does not decolorize 2 drops of tenth-normal iodine V.S. (*sulphite or thiosulphate*).

Add a slight excess of hydrochloric acid to an aqueous solution of the salt (1 in 50), and filter; the filtrate does not respond to the Test for heavy metals (see Part II, Test No. 3).

Assay—Proceed as directed under the Assay for alkali salts of organic acids (see Part II, Test No. 6), using about 2 Gm. of Sodium Salicylate, previously dried to constant weight at 100° C. and accurately weighed. It shows, in the dried salt, not less than 99.5 per cent. of $NaC_7H_5O_3$.

Each mil of half-normal sulphuric acid V.S. used corresponds to 0.08002 Gm. of $NaC_7H_5O_3$. Each gramme of Sodium Salicylate, previously dried, corresponds to not less than 12.43 mils of half-normal sulphuric acid V.S.

Average dose—Metric, 1 Gm.—Apothecaries, 15 grains.

SODII SULPHAS

Sodium Sulphate

Sod. Sulph.—Glauber's Salt

It contains not less than 43.64 per cent. nor more than 48 per cent. of anhydrous sodium sulphate, corresponding to not less than 99 per cent. of the crystallized salt [$Na_2SO_4+10H_2O=322.23$]. Preserve it in well-closed containers, in a cool place.

Sodium Sulphate occurs as large, colorless, transparent, monoclinic prisms, or granular crystals; odorless, and having a bitter, saline taste. The salt effloresces rapidly in the air.

One Gm. of Sodium Sulphate dissolves in slightly over 1 mil of water at 25° C.; insoluble in alcohol; soluble in glycerin; when heated to about 33° C. it melts in its water of crystallization.

An aqueous solution of the salt (1 in 10) is neutral to litmus.

When gently heated the salt fuses, and, on continuing the heat to 100° C., it loses all of its water of crystallization (about 56 per cent.). At a red heat, the anhydrous salt fuses without decomposition. To a non-luminous flame it imparts an intensely yellow color.

An aqueous solution of Sodium Sulphate (1 in 20) yields with barium chloride T.S. a white precipitate insoluble in hydrochloric acid.

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

An aqueous solution of the salt meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Assay—Dissolve about 1 Gm. of Sodium Sulphate, accurately weighed, in 100 mils of distilled water, acidulate the solution with hydrochloric acid and heat it to boiling. Gradually add an excess of hot barium chloride T.S., heat for thirty minutes on a water bath, collect the precipitate of barium sulphate on a filter, wash it until silver nitrate T.S. no longer produces an opalescence in 2 mils of the filtrate acidulated with nitric acid, dry, ignite, and weigh it. It corresponds to not less than 43.64 per cent. nor more than 48 per cent. of Na_2SO_4.

Each gramme of Sodium Sulphate corresponds to not less than 0.717 Gm. nor more than 0.789 Gm. of $BaSO_4$.

Average dose—Metric, 15 Gm.—Apothecaries, 4 drachms.

SODII SULPHIS EXSICCATUS

Exsiccated Sodium Sulphite

Sod. Sulphis Exsic.

It contains not less than 90 per cent. of Na_2SO_3 (126.07). Preserve it in well-closed containers, in a cool place.

Exsiccated Sodium Sulphite occurs as a white powder; odorless, and having a cooling, saline, sulphurous taste. Exposed to the air, it is slowly oxidized to sulphate.

One Gm. of Sodium Sulphite dissolves in 3.2 mils of water at 25° C.; sparingly soluble in alcohol.

An aqueous solution of the salt (1 in 10) is alkaline to litmus.

At a red heat, the salt fuses to a reddish-yellow mass of sodium sulphate and sodium sulphide. To a non-luminous flame the salt imparts an intensely yellow color.

Upon the addition of hydrochloric acid to the salt, sulphur dioxide is liberated, which is recognized by its odor, and by its blackening a strip of paper moistened with mercurous nitrate T.S. held in the escaping gas.

Dissolve 1 Gm. of Exsiccated Sodium Sulphite in 10 mils of diluted hydrochloric acid and heat the solution sufficiently to expel the gases; the liquid does not become turbid (*thiosulphate*).

Dissolve 1 Gm. of the salt in 20 mils of diluted hydrochloric acid, evaporate the solution to dryness, and dissolve the residue in 50 mils of distilled water. Ten mils of this solution does not respond to the Test for heavy metals (see Part II, Test No. 3).

Add 3 mils of nitric acid to 5 mils of an aqueous solution of the salt (1 in 25), cautiously evaporate the solution to dryness on a water bath, and treat the residue with a few mils of distilled water and filter the liquid. On evaporating the filtrate and washings to dryness, this residue meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Assay—Add about 0.3 Gm. of Exsiccated Sodium Sulphite, accurately weighed, to 50 mils of tenth-normal iodine V.S. in a glass-stoppered flask, agitate the mixture until complete solution results and titrate with tenth-normal sodium thiosulphate V.S., starch T.S. being used as indicator. It shows not less than 90 per cent. of Na_2SO_3.

Each mil of tenth-normal iodine V.S. used corresponds to 0.006304 Gm. of Na_2SO_3. Each gramme of Exsiccated Sodium Sulphite corresponds to not less than 142.8 mils of tenth-normal iodine V.S.

Average dose—Metric, 1 Gm.—Apothecaries, 15 grains.

SODII THIOSULPHAS

Sodium Thiosulphate

Sod. Thiosulph.—"Sodium Hyposulphite"

It contains not less than 63.07 per cent. nor more than 67.48 per cent. of anhydrous sodium thiosulphate, corresponding to not less than 99 per cent. of the crystallized salt [$Na_2S_2O_3+5H_2O=248.22$]. Preserve it in well-closed containers.

Sodium Thiosulphate occurs as colorless, transparent, monoclinic prisms; odorless, and having a cooling, afterwards bitter taste. It is permanent in the air below 33° C., but efflorescent in dry air above that temperature; slightly deliquescent in moist air.

One Gm. of Sodium Thiosulphate dissolves in 0.5 mil of water at 25° C.; insoluble in alcohol; at boiling temperatures it is rapidly decomposed.

An aqueous solution of the salt (1 in 10) is neutral or faintly alkaline to litmus.

When rapidly heated the salt melts. When heated slowly until it is effloresced, and afterwards to 100° C., it undergoes partial decomposition, loses all of its water of crystallization, and at red heat is decomposed, sulphur being liberated, while a residue of sodium sulphide and sodium sulphate remains. To a non-luminous flame it imparts an intensely yellow color.

An aqueous solution of Sodium Thiosulphate readily dissolves many compounds of silver (chloride, bromide, iodide, oxide, etc.) and discharges the color of a solution of iodine or of starch iodide.

Add a few drops of ferric chloride T.S. to 5 mils of an aqueous solution of the salt (1 in 10); a dark violet color is produced which disappears rapidly upon agitation.

The addition of sulphuric or hydrochloric acid to an aqueous solution of Sodium Thiosulphate liberates sulphur dioxide (recognized by its odor, and by its blackening a strip of paper moistened with mercurous nitrate T.S. held in the escaping gas); a white precipitate of sulphur is also formed (distinction from *sulphite or bisulphite*).

An aqueous solution of the salt (1 in 20) is not rendered turbid by the addition of ammonium oxalate T.S. (*calcium*).

Add 10 mils of diluted hydrochloric acid to 1 Gm. of the salt, evaporate it to dryness on a water bath, heat the residue with 50 mils of distilled water and filter. Ten mils of this filtrate does not respond to the Test for heavy metals (see Part II, Test No. 3).

Add 3 mils of nitric acid to 5 mils of an aqueous solution of the salt (1 in 25), evaporate the solution cautiously to dryness on a water bath, treat the residue with a few mils of distilled water, filter the liquid and evaporate the filtrate and washings to dryness; the residue meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Assay—Dissolve about 1 Gm. of Sodium Thiosulphate, accurately weighed, in about 20 mils of distilled water and titrate with tenth-normal iodine V.S., starch T.S. being used as indicator. It shows not less than 63.07 per cent. nor more than 67.48 per cent. of $Na_2S_2O_3$.

Each mil of tenth-normal iodine V.S. used corresponds to 0.015814 Gm. of $Na_2S_2O_3$. Each gramme of Sodium Thiosulphate corresponds to not less than 39.9 mils nor more than 42.7 mils of tenth-normal iodine V.S.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

SPARTEINÆ SULPHAS

Sparteine Sulphate

Spartein. Sulph.

The sulphate $[C_{15}H_{26}N_2.H_2SO_4+5H_2O=422.39]$ of sparteine, a liquid alkaloid obtained from *Cytisus Scoparius* (Linné), Link (Fam. *Leguminosæ*). Preserve it in well-closed containers, protected from light.

Sparteine Sulphate occurs in colorless, rhombohedral crystals, or as a crystalline powder; odorless, and having a slightly saline and somewhat bitter taste. It is hygroscopic.

One Gm. of Sparteine Sulphate dissolves in 1.1 mils of water and in 3 mils of alcohol at 25° C.; insoluble in chloroform or ether.

Its aqueous solution (1 in 20) is neutral or acid to litmus.

Add 25 mils of ether and a few drops of diluted ammonia water, avoiding an excess, to about 0.1 Gm. of Sparteine Sulphate in a test tube, then add to the mixture an ethereal solution of iodine (1 in 50) until the liquid, when shaken, turns from an orange to a dark reddish-brown color. After a short time, the bottom and sides of the test tube will be coated with minute, dark greenish-brown crystals.

Barium chloride T.S. produces a white precipitate insoluble in hydrochloric acid when added to an aqueous solution of Sparteine Sulphate.

Incinerate about 1 Gm. of Sparteine Sulphate; not more than 0.1 per cent. of ash remains.

A solution of about 0.1 Gm. of the salt in 2 mils of sulphuric acid is colorless (*readily carbonizable organic impurities*).

Shake about 0.1 Gm. of Sparteine Sulphate in a test tube with 5 mils of potassium hydroxide T.S., the liquid at first becomes turbid, and small, colorless or nearly colorless drops of sparteine gradually collect on the surface. Suspend a strip of moistened red litmus paper in the mouth of a test tube, and apply a gentle heat; the test paper gradually acquires a blue color, but no odor of ammonia is perceptible (*ammonium salts*).

A mixture of about 0.1 Gm. of Sparteine Sulphate, 0.5 mil of chloroform and 0.5 mil of alcoholic half-normal potassium hydroxide V.S. does not emit an odor of phenylisocyanide on heating (*aniline*).

AVERAGE DOSE—Metric, 0.01 Gm.—Apothecaries, ⅙ grain.

SPIGELIA

Spigelia

Pinkroot

The dried rhizome and roots of *Spigelia marilandica* Linné (Fam. *Loganiaceæ*), without the presence or admixture of more than 10 per cent. of stems or other foreign matter.

Rhizome horizontal or slightly oblique, more or less flexuous, somewhat branched, from 1.5 to 5 cm. in length and from 2 to 5 mm. in diameter; externally dark brown, slightly annulate, with scars of bud scales, the upper surface knotty from approximate stem-bases, bearing cup-shaped scars; from the lower and lateral portions arise numerous, long, rather coarse, sparingly branched, brittle roots; fracture short, internally differentiated into three nearly equal zones of pith, wood and bark; odor slightly aromatic; taste bitter, pungent.

Few if any of the roots exhibit thin, terminal portions with the bark stripped from the slender strands of wood.

Stems usually attached to the upper portion of the rhizome, nearly cylindrical, attaining a length of 6 cm. and a diameter of 3 mm., light grayish-brown to purplish-brown, nodes annulate, marked by opposite leaf-scars.

Under the microscope, transverse sections of the rhizome of Spigelia show a dark brown, more or less exfoliated epidermal layer; a cortex composed of from 10 to 15 rows of starch-bearing parenchyma; a distinct zone of sieve tissue from 0.075 to 0.15 mm. in width; a compact woody area composed of tracheæ and tracheids which are hardly distinguishable from each other, both kinds of vessels being marked with bordered pores; an internal sieve closely resembling the sieve in the bark; and a pith composed of fairly uniform, nearly polygonal, thin-walled cells, more or less filled with small starch grains.

Transverse sections of the root show a large cortex, the cells of which are more or less filled with small starch grains and a central stele of 6 or 8 radial fibro-vascular bundles, which in the older roots are united by a strong development of lignified cells.

The stem in transverse section is distinguished from the rhizome by a narrower woody zone, the tracheæ having spiral thickenings, and by a nearly uninterrupted circle of non-lignified bast-fibers in the bark.

The powder is grayish-brown; when examined under the microscope it exhibits starch grains generally numerous, at times, however, few, spherical or slightly angular, from 0.002 to 0.006 mm. in diameter; fragments of lignified tracheæ and tracheids conspicuous; fragments of tracheæ with spiral thickening relatively few; bast-fibers few, very long, non-lignified; occasional fragments of the reddish-brown epidermal cells.

Spigelia yields not more than 10 per cent. of ash.

Preparation—Fluidextractum Spigeliæ.

AVERAGE DOSE—Metric, 4 Gm.—Apothecaries, 60 grains.

SPIRITUS ÆTHERIS

Spirit of Ether

Sp. Æth.—Hoffmann's Drops

ETHER, *three hundred and twenty-five milliliters*	325 mils
ALCOHOL, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Mix the ether with a sufficient quantity of alcohol to make the product measure *one thousand mils.*

Average dose—Metric, 4 mils—Apothecaries, 1 fluidrachm.

SPIRITUS ÆTHERIS NITROSI

Spirit of Nitrous Ether

Sp. Æth. Nitros.—Sweet Spirit of Nitre

An alcoholic solution of ethyl nitrite $[C_2H_5NO_2=75.05]$, containing not less than 3.5 per cent. nor more than 4.5 per cent. of $C_2H_5NO_2$. Preserve it in small, well-stoppered, dark amber-colored bottles, in a cool and dark place, remote from fire.

Sodium Nitrite, *one hundred grammes*	100.0 Gm.
Sulphuric Acid, *forty milliliters*	40.0 mils
Monohydrated Sodium Carbonate, *six-tenths of a gramme*	0.6 Gm.
Potassium Carbonate, completely deprived of water by heating, *three grammes*	3.0 Gm.
Alcohol,	
Water, each, *a sufficient quantity.*	

Mix the sulphuric acid with *one hundred and twenty mils* of water, cool the liquid, add *eighty-five mils* of alcohol previously diluted with an equal volume of water, and introduce the solution into a 1000 mil flask, surrounded by a mixture of ice and water. Dissolve the sodium nitrite in *two hundred and eighty mils* of water, filter, and, having poured the filtrate into a separatory funnel, allow the liquid to slowly drop into the flask containing the acid mixture. When all has been added and the reaction is complete, allow any crystals which may have formed to settle at the bottom of the flask, and decant the cold mixture of ethyl nitrite and aqueous solution quickly to the previously cooled separatory funnel, and draw off and discard the aqueous liquid. Wash the separated ethyl nitrite, first, with *twenty mils* of ice-cold water, and then remove any traces of acid by washing it with *fifteen mils* of ice-cold water, in which the monohydrated sodium carbonate has previously been dissolved. Carefully separate the ethyl nitrite from the aqueous liquid, and agitate it in a well-stoppered bottle with the potassium carbonate to remove traces of water. Then cool the liquid, decant, and pour the ethyl nitrite immediately into a tared bottle containing *five hundred grammes* of alcohol. Ascertain the weight of the ethyl nitrite poured into the alcohol by noting the increase in weight of the tared bottle and contents, and then add enough alcohol to make the mixture weigh *twenty-two times* the weight of the ethyl nitrite added. Lastly, transfer the product to small, well-stoppered, dark amber-colored bottles, and keep these in a cool place, remote from fire.

Spirit of Nitrous Ether is a clear, mobile, volatile, and inflammable liquid of a pale yellow or faintly greenish-yellow tint, having a fragrant, ethereal, and pungent odor free from acridity, and a sharp, burning taste.

When freshly prepared, or even after being kept for some time with but little exposure to light and air, it is neutral to dry litmus paper. When long kept or after having been exposed to light and air, it acquires an acid reaction. Effervescence must not result when a crystal of potassium bicarbonate is added.

Specific gravity: not above 0.823 at 25° C.

Immerse a test tube half filled with the Spirit in a water bath heated to 65° C. until it has acquired that temperature; the Spirit distinctly boils upon the addition of a few small pieces of broken glass.

Mix 10 mils of the Spirit with 5 mils of potassium hydroxide T.S., previously diluted with 5 mils of distilled water; the mixture assumes a yellow color which does not turn decidedly brown within twelve hours (*aldehyde*).

Assay—Transfer about 40 mils of Spirit of Nitrous Ether, which has been previously shaken with 0.5 Gm. of powdered potassium bicarbonate, to a tared, 100 mil measuring-flask, and weigh it accurately. Add sufficient alcohol to bring the volume to exactly 100 mils and mix thoroughly. Introduce into a nitrometer (see Part II, Gasometric Estimations) exactly 10 mils of the alcoholic solution, follow it by 10 mils of potassium iodide T.S., and afterwards by 5 mils of diluted sulphuric acid. When the volume of gas has become constant (within thirty to sixty minutes), note the volume of gas collected. Multiply this volume in mils by 0.307, and divide the product by one-tenth of the weight in grammes of the Spirit of Nitrous Ether taken. At standard temperature and pressure, the quotient represents the percentage of ethyl nitrite in the liquid. The temperature correction is one-third of 1 per cent. of the total percentage just found for each degree, additive if temperature is below, subtractive if above, 25° C. The barometric correction is four-thirtieths of 1 per cent. of the total percentage just found for each mm., additive if above, subtractive if below, 760 mm.

Preparation—Mistura Glycyrrhizæ Composita.

AVERAGE DOSE—Metric, 2 mils—Apothecaries, 30 minims.

SPIRITUS AMMONIÆ AROMATICUS

Aromatic Spirit of Ammonia

Sp. Ammon. Arom.

AMMONIUM CARBONATE, in translucent pieces, *thirty-four grammes*	34 Gm.
AMMONIA WATER, *ninety milliliters*	90 mils
OIL OF LEMON, *ten milliliters*	10 mils
OIL OF LAVENDER, *one milliliter*	1 mil
OIL OF MYRISTICA, *one milliliter*	1 mil
ALCOHOL, *seven hundred milliliters*	700 mils
DISTILLED WATER, *a sufficient quantity*,	
To make *one thousand milliliters*	1000 mils

To the ammonia water, contained in a flask, add *one hundred and forty mils* of distilled water, and afterwards the ammonium carbonate reduced to a moderately fine powder. Close the flask and agitate the contents until the ammonium carbonate is dissolved and allow it to stand for twelve hours. Introduce the alcohol into a graduated bottle of suitable capacity, add first the oils, then gradually the solution of ammonium carbonate, and afterwards enough distilled water to make the product measure *one thousand mils.* Set the liquid aside during twenty-four hours in a cool place, occasionally agitating it, and then filter through paper, in a well-covered funnel.

Preserve the product in glass-stoppered bottles, in a cool place.

A nearly colorless liquid when freshly prepared, but gradually acquiring a yellow color.
It has the pungent odor and taste of ammonia.
Specific gravity: about 0.900 at 25° C.

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

SPIRITUS AMYGDALÆ AMARÆ

Spirit of Bitter Almond

Sp. Amygd. Amar.

Oil of Bitter Almond, *ten milliliters*	10 mils
Alcohol, *eight hundred milliliters*	800 mils
Distilled Water, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Dissolve the oil in the alcohol, and add enough distilled water to make the product measure *one thousand mils.*

Note—This Spirit is intended for medicinal use; it must not be used for flavoring foods.

Average dose—Metric, 0.5 mil—Apothecaries, 8 minims.

SPIRITUS ANISI

Spirit of Anise

Sp. Anisi

Oil of Anise, *one hundred milliliters*	100 mils
Alcohol, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Mix the oil with sufficient alcohol to make the product measure *one thousand mils.*

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

SPIRITUS AURANTII COMPOSITUS

Compound Spirit of Orange

Sp. Aur. Co.

Oil of Orange, *two hundred milliliters*	200 mils
Oil of Lemon, *fifty milliliters*	50 mils
Oil of Coriander, *twenty milliliters*	20 mils
Oil of Anise, *five milliliters*	5 mils
Alcohol, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Mix them. Keep the product in completely filled, well-stoppered bottles, in a cool and dark place.

Preparation—Elixir Aromaticum.

SPIRITUS CAMPHORÆ

Spirit of Camphor

Sp. Camph.

One hundred mils of Spirit of Camphor yields not less than 9.5 Gm. nor more than 10.5 Gm. of camphor.

Camphor, *one hundred grammes*	100 Gm.
Alcohol, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Dissolve the camphor in *eight hundred mils* of alcohol, filter through paper, and pass enough alcohol through the filter to make the product measure *one thousand mils.*

Add 0.05 Gm. of anhydrous potassium carbonate to 5 mils of Spirit of Camphor; the potassium carbonate does not liquefy or adhere to the bottom of the vessel (*added water*).

Assay—Fill a two hundred millimeter polariscope tube with the Spirit of Camphor and take the mean of four or more readings of the rotation, beginning at zero each time. The temperature correction for each degree is half a minute, additive if above, subtractive if below, 25° C. Evaporate 60 mils of the Spirit of Camphor in a dish, on a water bath, and when the camphor begins to solidify stir it with a glass rod until dry. Then transfer the camphor to a watch glass, cover it with an inverted funnel and place the watch glass on wire gauze 10 cm. above a Bunsen burner having a flame 4 cm. high. When the camphor has all sublimed, dissolve 2.5 Gm. of the sublimate in sufficient alcohol (which must be of about 95 per cent. by volume) to make exactly 25 mils and take the mean of four or more polariscope readings as before. The minutes of rotation of the Spirit of Camphor divided by the minutes of rotation of the control test just made, and this multiplied by 10, shows the number of grammes of camphor in 100 mils of the Spirit of Camphor.

Average dose—Metric, 1 mil—Apothecaries, 15 minims.

SPIRITUS CHLOROFORMI

Spirit of Chloroform

Sp. Chlorof.

Chloroform, *sixty milliliters*	60 mils
Alcohol, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Mix the chloroform with sufficient alcohol to make the product measure *one thousand mils.*

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

SPIRITUS CINNAMOMI

Spirit of Cinnamon

Sp. Cinnam.

Oil of Cinnamon, *one hundred milliliters*	100 mils
Alcohol, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Mix the oil with sufficient alcohol to make the product measure *one thousand mils.*

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

SPIRITUS GLYCERYLIS NITRATIS

Spirit of Glyceryl Trinitrate

Sp. Glyceryl. Nit.—Spirit of Glonoin Spirit of Nitroglycerin

An alcoholic solution containing not less than 1 per cent. nor more than 1.1 per cent. of $C_3H_5(NO_3)_3$ (227.07). Preserve it in well-stoppered bottles in a cool, dark place, remote from fire.

Great care must be exercised in dispensing, handling, packing, transporting, and storing this Spirit, since a dangerous explosion may result if any considerable quantity of it is spilled, and the alcohol wholly or partly lost by evaporation. If, through accident, it is spilled, a solution of potassium hydroxide must be poured over it at once to effect partial decomposition.

Spirit of Glyceryl Trinitrate is a clear, colorless liquid, having the odor of alcohol. *Caution must be exercised in tasting it,* since even a small quantity is liable to produce a violent headache. The same effect is produced when it is applied to the skin.

It is neutral to litmus.

Specific gravity: 0.814 to 0.820 at 25° C.

Heat about 10 mils of Spirit of Glyceryl Trinitrate on a water bath with 1 mil of potassium hydroxide T.S. until the alcohol is evaporated, and then heat a portion of the residue with about 0.5 Gm. of potassium bisulphate; the pungent odor of acrolein is evolved. Dissolve the remainder of the residue in 2 mils of distilled water acidulated with diluted sulphuric acid, add a few drops of diphenylamine T.S. and pour the solution upon 2 mils of sulphuric acid in a test tube so as to form a separate layer; a dark blue color is produced at the zone of contact.

Mix 10 mils of the Spirit with 11 mils of distilled water, both previously cooled to 15° C.; a clear solution results. On now adding 2 mils more of distilled water, the mixture, at 15° C., becomes turbid.

Weigh accurately not more than about 5 mils of the Spirit, allow it to evaporate spontaneously in a tared dish protected from dust, and dry the residue to constant weight in a desiccator, over sulphuric acid. The weight of the residue corresponds to not less than 1 per cent. nor more than 1.1 per cent. of the weight of Spirit taken.

AVERAGE DOSE—Metric, 0.05 mil—Apothecaries, 1 minim.

SPIRITUS JUNIPERI

Spirit of Juniper

Sp. Junip.

OIL OF JUNIPER, *fifty milliliters*	50 mils
ALCOHOL, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Mix the oil with sufficient alcohol to make the product measure *one thousand mils.*

AVERAGE DOSE—Metric, 2 mils—Apothecaries, 30 minims.

SPIRITUS JUNIPERI COMPOSITUS

Compound Spirit of Juniper

Sp. Junip. Co.

OIL OF JUNIPER, *eight milliliters*	8 mils
OIL OF CARAWAY, *one milliliter*	1 mil
OIL OF FENNEL, *one milliliter*	1 mil
ALCOHOL, *fourteen hundred milliliters*	1400 mils
WATER, *a sufficient quantity,*	
To make *two thousand milliliters*	2000 mils

Dissolve the oils in the alcohol, and gradually add enough water to make the product measure *two thousand mils.*

AVERAGE DOSE—Metric, 10 mils—Apothecaries, 2½ fluidrachms.

SPIRITUS LAVANDULÆ

Spirit of Lavender

Sp. Lavand.

Oil of Lavender, *fifty milliliters*	50 mils
Alcohol, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Mix the oil with sufficient alcohol to make the product measure *one thousand mils.*

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

SPIRITUS MENTHÆ PIPERITÆ

Spirit of Peppermint

Sp. Menth. Pip.—Essence of Peppermint

Oil of Peppermint, *one hundred milliliters*	100 mils
Peppermint, bruised, *ten grammes*	10 Gm.
Alcohol, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Macerate the peppermint leaves, freed as much as possible from stems, during one hour in *five hundred mils* of water and then strongly express them. Mix *eight hundred mils* of alcohol with the oil, add the macerated leaves and enough alcohol to make *one thousand mils,* macerate the mixture during six hours, with frequent agitation, and then filter it. Preserve the product in amber-colored bottles.

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

SPIRITUS MENTHÆ VIRIDIS

Spirit of Spearmint

Sp. Menth. Vir.

Oil of Spearmint, *one hundred milliliters*	100 mils
Spearmint, bruised, *ten grammes*	10 Gm.
Alcohol, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Macerate the spearmint leaves, freed as much as possible from stems, during one hour in *five hundred mils* of water and then strongly express them. Mix *eight hundred mils* of alcohol with the oil, add the macerated leaves and enough alcohol to make *one thousand mils,* macerate the mixture during six hours, with frequent agitation, and then filter it. Preserve the product in amber-colored bottles.

AVERAGE DOSE—Metric, 2 mils—Apothecaries, 30 minims.

STAPHISAGRIA

Staphisagria

Staphisag.—Stavesacre

The ripe seeds of *Delphinium Staphisagria* Linné (Fam. *Ranunculaceæ*), without the presence or admixture of more than 2 per cent. of foreign vegetable matter.

Irregularly triangular, flattened, or somewhat tetrahedral, one side being convex, from 4 to 7 mm. in length and from 3 to 6 mm. in breadth; externally dark brown, becoming lighter with age, and coarsely reticulate; easily cut, showing a somewhat light brown, oily endosperm, enclosing a small embryo at the pointed end; odor slight, disagreeable; taste intensely bitter and acrid.

Under the microscope, transverse sections of Staphisagria show an outer layer of nearly tabular, thick-walled, non-lignified cells, some being extended centrifugally, and forming the reticulations of the seed-coat; 2 or 3 rows of parenchyma cells with more or less irregular thin walls; a thin layer of very small, thick-walled cells with numerous, lattice-like or reticulate pores; endosperm large, composed of polygonal cells enclosing small aleurone grains and fixed oil, the latter forming in large globules on the addition of hydrated chloral T.S.

Preparation—Fluidextractum Staphisagriæ.

AVERAGE DOSE—Metric, 0.06 Gm.—Apothecaries, 1 grain.

STILLINGIA

Stillingia

Stilling.—Queen's Root

The dried roots of *Stillingia sylvatica* Linné (Fam. *Euphorbiaceæ*). Preserve Stillingia in tightly-closed containers, adding a few drops of chloroform or carbon tetrachloride, from time to time, to prevent attack by insects.

When entire, terete, unequally tapering, rarely branched, usually in pieces attaining a length of 40 cm. and from 0.5 to 3 cm. in diameter, externally reddish-brown, longitudinally wrinkled; fracture very fibrous; internally the bark is light reddish-brown, thick, spongy, finely fibrous, with numerous resin cells and easily separable from the porous, radiate wood; odor distinct; taste bitter, acrid and pungent.

The powder is pinkish-brown or light reddish-brown; when examined under the microscope it exhibits numerous starch grains from 0.005 to 0.035 mm. in diameter, mostly single, very variable in shape, and usually with a central cleft; numerous fragments, with more or less tabular secretion cells, containing a reddish-brown, amorphous, resinous substance; fragments of tracheæ mostly with simple pores and associated with wood-fibers, the walls being very thin, lignified and possessing numerous, transverse, slit-like simple pores; bast-fibers long, narrow, the walls thick and slightly lignified; fragments of reddish-brown cork cells; occasionally crystals of calcium oxalate in rosette aggregates about 0.035 mm. in diameter.

Stillingia yields not more than 5 per cent. of ash.

Preparation—Fluidextractum Stillingiæ.

AVERAGE DOSE—Metric, 2 Gm.—Apothecaries, 30 grains.

STRAMONIUM

Stramonium

Stramon.—Jamestown Weed Jimson Weed

The dried leaves of *Datura Stramonium* Linné, or of *Datura Tatula* Linné (Fam. *Solanaceæ*), without the presence or admixture of more than 10 per cent. of stems or other foreign matter, and yielding not less than 0.25 per cent. of the total alkaloids of Stramonium.

Usually much wrinkled and either loose or more or less matted together; laminæ when entire from 2 to 30 cm. in length, having petioles from 0.5 to 8 cm. in length; inequilaterally ovate, summits acute or acuminate, bases unequal, one side extending from 3 to 12 mm. below the other, margins sinuate, toothed or angled, the teeth being few, acute or acuminate and with rounded sinuses; frequently with numerous circular perforations which may have become filled with cork; upper surfaces dark green, sparsely hairy, especially upon the veins, lower surfaces light green; odor distinct, heavy and narcotic; taste unpleasant, nauseous. Stems cylindrical, usually flattened, attaining a length of 30 cm. and a diameter of 7 mm.; longitudinally wrinkled, occasionally with 1 or more deep furrows, light greenish-brown to purplish-brown.

The powder is brownish-green; upon clearing the fragments with hydrated chloral T.S. and examining under the microscope, it shows numerous elliptical stomata, about 0.025 mm. in length, and surrounded usually with 3 neighboring cells; cells of the mesophyll containing numerous small chloroplastids; calcium oxalate either in rosette aggregates, from 0.01 to 0.02 mm. in diameter, or in rod-like crystals, or in the form of sphenoidal micro-crystals; non-glandular hairs few, characteristic, 2- to 4-celled, attaining a length of 0.5 mm., the basal cell about 0.04 mm. in width, some of the cells more or less collapsed, the outer walls with numerous, slight, centrifugal projections; glandular hairs few, with 1- to 2-celled stalks and usually 2- to 4-celled, glandular heads; tracheæ annular or spiral, fragments of the tracheal wall frequently detached. Stem fragments show large annular or spiral tracheæ which occasionally are thickened, with simple or bordered pores and associated with wood parenchyma; fragments with long, narrow unequally thickened collenchymatous cells; parenchyma with sphenoidal micro-crystals; wood-fibers occasional; bast-fibers absent.

Stramonium yields not more than 20 per cent. of ash.

Assay—Proceed as directed under *Belladonnæ Radix*, page 73, using 15 Gm. of Stramonium, in No. 60 powder, increasing the amount of water to be added after maceration to 25 mils, and, before titration, treating the final residue twice with 5 mils of ether, evaporating to dryness each time.

Each mil of tenth-normal sulphuric acid consumed corresponds to 28.92 milligrammes of the total alkaloids of Stramonium.

Preparations—Extractum Stramonii (Pilular) Extractum Stramonii (Powdered) Tinctura Stramonii Unguentum Stramonii (from Extract).

AVERAGE DOSE—Metric, 0.06 Gm.—Apothecaries, 1 grain.

STRONTII BROMIDUM

Strontium Bromide

Stront. Brom.

It contains not less than 98 per cent. of $SrBr_2+6H_2O$ (355.57). Preserve it in well-closed containers.

Strontium Bromide occurs as colorless, transparent, hexagonal crystals; odorless, and having a bitter, saline taste. The salt deliquesces in moist air but effloresces in very dry air.

One Gm. of Strontium Bromide dissolves in 0.35 mil of water at 25° C.; soluble in alcohol; insoluble in ether.

Its aqueous solution (1 in 20) is neutral to litmus.

When quickly heated, the crystals at first melt, and at above 180° C. lose all of their water of crystallization.

To a non-luminous flame the salt communicates a crimson color.

Silver nitrate T.S. added to an aqueous solution of the salt (1 in 10) produces a yellowish-white precipitate, insoluble in nitric acid or in a moderate excess of ammonia water.

With calcium sulphate T.S. an aqueous solution of the salt (1 in 20) slowly forms a white precipitate of strontium sulphate, insoluble in dilute acids; the precipitation occurs more quickly with diluted sulphuric acid or a readily soluble sulphate.

Add a few drops of ferric chloride T.S. and 1 mil of chloroform to 10 mils of an aqueous solution of the salt (1 in 20) and shake the mixture; the chloroform does not acquire a violet tint (*iodine*).

Drop 1 mil of diluted sulphuric acid upon about 1 Gm. of the powdered salt; no yellow color appears at once (*bromate*).

Dissolve 1 Gm. of Strontium Bromide and 1 Gm. of sodium acetate in 5 mils of distilled water, and render the solution slightly acid by the addition of from 3 to 5 drops (or a sufficient quantity) of diluted acetic acid. The solution, upon the addition of 5 drops of potassium dichromate T.S. and agitation, does not become cloudy within three minutes (*barium*).

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

Assay—Proceed as directed under the Assay for bromides (see Part II, Test No. 5), using about 0.8 Gm. of Strontium Bromide, accurately weighed. It shows not less than 98 per cent. of $SrBr_2+6H_2O$.

Each mil of tenth-normal silver nitrate V.S. used corresponds to 0.017778 Gm. of $SrBr_2+6H_2O$. Each gramme of Strontium Bromide corresponds to not less than 55.1 mils nor more than 56.6 mils of tenth-normal silver nitrate V.S.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

STRONTII IODIDUM

Strontium Iodide

Stront. Iod.

It contains not less than 99 per cent. of SrI_2+6H_2O (449.57). Preserve it in small, amber-colored, glass-stoppered bottles, carefully protected from light.

Strontium Iodide occurs as colorless, transparent, hexagonal plates, as a white, granular powder, or in crystalline crusts; odorless, and having a bitter, saline taste. It is deliquescent, and is colored yellow by exposure to air and light.

One Gm. of Strontium Iodide dissolves in about 0.2 mil of water at 25° C.; soluble in alcohol; slightly soluble in ether.

Its aqueous solution (1 in 20) is neutral or slightly alkaline to litmus.

When cautiously heated, the crystals melt and gradually lose their water of crystallization. At a red heat, the salt is decomposed, losing iodine and leaving a residue of strontium oxide.

To a non-luminous flame it imparts a crimson color.

When calcium sulphate T.S. is added to an aqueous solution (1 in 10) it slowly forms a white precipitate of strontium sulphate, insoluble in dilute acids; the precipitation occurs more quickly with diluted sulphuric acid or a readily soluble sulphate.

Add 1 mil of ferric chloride T.S. to 5 mils of an aqueous solution of the salt (1 in 20); iodine is liberated, which imparts a violet color to chloroform, when shaken with it.

Dissolve 1 Gm. of Strontium Iodide and 1 Gm. of sodium acetate in 5 mils of distilled water, and render the solution slightly acid by the addition of from 3 to 5 drops (or a sufficient quantity) of diluted acetic acid. The solution, upon the addition of five drops of potassium dichromate T.S. and agitation, does not become cloudy within three minutes (*barium*).

Gently heat 5 mils of an aqueous solution of the salt (1 in 10) with 1 drop of ferrous sulphate T.S., 1 drop of ferric chloride T.S., and 0.5 mil of potassium hydroxide T.S.; no blue color appears after acidulating the mixture with hydrochloric acid (*cyanide*).

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

Dissolve 0.3 Gm. of the salt in 5 mils of distilled water, add an excess of silver nitrate T.S. and a few drops of nitric acid; filter, digest the precipitate with 5 mils of ammonia water and filter. On saturating the filtrate with nitric acid, not more than a slight turbidity is produced (*chloride or bromide*).

Assay—Proceed as directed under the Assay for iodides (see Part II, Test No. 5), using about 1 Gm. of Strontium Iodide, accurately weighed. It shows not less than 99 per cent. of SrI_2+6H_2O.

Each mil of tenth-normal silver nitrate V.S. used corresponds to 0.022478 Gm. of SrI_2+6H_2O. Each gramme of Strontium Iodide corresponds to not less than 44 mils of tenth-normal silver nitrate V.S.

AVERAGE DOSE—Metric, 0.3 Gm.—Apothecaries, 5 grains.

STRONTII SALICYLAS

Strontium Salicylate

Stront. Salicyl.

It contains, when dried to constant weight in a desiccator over sulphuric acid, not less than 99 per cent. of $Sr(C_7H_5O_3)_2+2H_2O$ (397.74). Preserve it in well-closed containers, protected from heat and light.

Strontium Salicylate occurs as a white, crystalline powder; odorless, and having a somewhat sweet, saline taste.

One Gm. of Strontium Salicylate dissolves in 19 mils of water, and in 61 mils of alcohol at 25° C.; also in 3.7 mils of boiling water and in 14 mils of boiling alcohol.

When heated, the salt is decomposed, giving off inflammable vapors and an odor of phenol, and finally leaving a residue of strontium carbonate and carbon.

To a non-luminous flame it imparts a crimson color.

An aqueous solution of the salt (1 in 30) is colorless.

With calcium sulphate T.S. an aqueous solution of the salt (1 in 20) slowly forms a white precipitate of strontium sulphate, insoluble in dilute acids.

Add a few drops of ferric chloride T.S. to an excess of a concentrated aqueous solution of Strontium Salicylate; a dark red color and a precipitate are produced; in an aqueous solution of the salt (1 in 100) a deep violet-blue color is produced.

Diluted hydrochloric acid produces a voluminous, white precipitate of salicylic acid in a concentrated aqueous solution of the salt.

Add 1 mil of diluted sulphuric acid to 10 mils of an aqueous solution of Strontium Salicylate (1 in 50) and filter; the filtrate does not respond to the Test for heavy metals (see Part II, Test No. 3).

Agitate 2 Gm. of Strontium Salicylate with 10 mils of diluted acetic acid, heat the mixture, cool, and then filter. The filtrate, upon the addition of 5 drops of potassium dichromate T.S., does not become cloudy within three minutes (*barium*).

Assay.—Introduce into a platinum crucible about 2 Gm. of Strontium Salicylate, previously dried to constant weight in a desiccator over sulphuric acid and accurately weighed, and thoroughly carbonize it at a temperature not exceeding red heat. Dissolve the residue in 30 mils of half-normal hydrochloric acid V.S., and submit it to residual titration with normal potassium hydroxide V.S., using methyl orange T.S. as indicator. It shows, in the dried salt, not less than 99 per cent. of $Sr(C_7H_5O_3)_2+2H_2O$.

Each mil of half-normal hydrochloric acid V.S. used corresponds to 0.099435 Gm. of $Sr(C_7H_5O_3)_2+2H_2O$. Each gramme of Strontium Salicylate, previously dried, corresponds to not less than 9.96 mils of half-normal hydrochloric acid V.S.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

STROPHANTHINUM

Strophanthin

Strophanthin.

A glucoside or mixture of glucosides obtained from *Strophanthus Kombe* Oliver (Fam. *Apocynaceæ*). Preserve it in well-closed containers, protected from light.

Strophanthin is a white or yellowish powder containing varying amounts of water, which it does not lose entirely without decomposition. It is permanent in the air. *Great caution must be used in tasting it and then only in very dilute solutions.*

Strophanthin is very soluble in water and in diluted alcohol, less soluble in dehydrated alcohol; nearly insoluble in chloroform, ether, or benzene.

Its solutions are neutral to litmus and are dextrorotatory.

Sulphuric acid added to Strophanthin produces an emerald-green color, changing to brown.

Add a trace of ferric chloride T.S. and a few mils of sulphuric acid to an aqueous solution of Strophanthin; a red-brown precipitate is produced which turns dark green after one or two hours.

No weighable ash remains on incinerating 0.1 Gm. of Strophanthin.

A solution of 0.1 Gm. of Strophanthin in 15 mils of distilled water, when mixed with 5 mils of hot alkaline cupric tartrate V.S., produces no precipitate; but on heating an aqueous solution to 70° C. with a small amount of dilute hydrochloric acid (1 in 20), it is hydrolized into strophanthidin, which precipitates, and a sugar which remains in solution. The latter is capable of reducing alkaline cupric tartrate V.S.

		Metric	Apothecaries
AVERAGE DOSE—Daily Caution.	Mouth,	0.001 Gm.	—$\frac{1}{60}$ grain.
	Intravenous,	0.00075 Gm.	—$\frac{1}{80}$ grain.

STROPHANTHUS

Strophanthus

Strophanth.

The dried, ripe seeds of *Strophanthus Kombe* Oliver, or of *Strophanthus hispidus* De Candolle (Fam. *Apocynaceæ*), deprived of the long awns. If made into the official tincture and assayed biologically the minimum lethal dose should not be greater than 0.00006 mil of tincture, or the equivalent in tincture of 0.0000005 Gm. of ouabain, for each gramme of body weight of frog. Preserve Strophanthus in tightly-closed containers, adding a few drops of chloroform or carbon tetrachloride, from time to time, to prevent attack by insects.

Lance-ovoid, flattened and obtusely edged; from 7 to 20 mm. in length, about 4 mm. in breadth and about 2 mm. in thickness; externally of a light fawn color with a distinct, greenish tinge, silky lustrous from a dense coating of closely appressed hairs (*S. Kombe*); or light to dark brown, nearly smooth and sparingly hairy (*S. hispidus*), bearing on one side a ridge running from about the center to the summit; fracture short and somewhat soft, the fractured surface whitish and oily; odor heavy when the seeds are crushed and moistened; taste very bitter.

Under the microscope, sections of *Strophanthus Kombe* show a seed-coat composed of several layers of more or less collapsed, thin-walled cells and from the epidermal layer arise numerous non-glandular hairs, which are from 0.2 to 0.8 mm. in length, usually more or less bent, thin-walled, and slightly lignified at the base; in the rhaphe occurs a tangentially elongated fibro-vascular bundle having numerous spiral tracheæ; endosperm of from 9 to 30 rows of more or less polygonal cells with slightly thickened walls and containing small aleurone grains, a fixed oil, and strophanthin, the latter being colored bright green upon the addition of sulphuric acid; in the center occur two large plano-convex cotyledons having a distinct epidermal layer, a few fibro-vascular bundles and numerous parenchyma cells containing aleurone grains, a fixed oil, and occasionally a small amount of strophanthin.

Sections of *S. hispidus* resemble those of *S. Kombe*, the hairs being fewer and the bases more strongly lignified.

The powder is grayish-brown to dark brown; odor distinct; when examined under the microscope it exhibits chiefly thin-walled parenchyma cells and fragments of long, thin-walled hairs, the latter relatively few in *S. hispidus;* mounts made with hydrated chloral T.S. show numerous oil globules; upon the addition of sulphuric acid many of the fragments of the endosperm may be colored greenish.

Strophanthus yields not more than 5 per cent. of ash.

Assay—For a method of assaying Strophanthus see Biological Assays (Part II).

Preparation—Tinctura Strophanthi.

AVERAGE DOSE—Metric, 0.06 Gm.—Apothecaries, 1 grain.

STRYCHNINA

Strychnine

Strych.

An alkaloid [$C_{21}H_{22}O_2N_2 = 334.20$] obtained from nux vomica, and also obtainable from other seeds of the *Loganiaceæ*. Preserve it in well-closed containers.

Strychnine occurs in colorless, transparent, prismatic crystals, or as a white, crystalline powder; odorless, permanent in the air. *Great caution must be used in tasting it and then only in very dilute solutions* which are exceedingly bitter.

One Gm. of Strychnine dissolves in 6420 mils of water, 136 mils of alcohol, 5 mils of chloroform, and in 180 mils of benzene at 25° C.; also in 3100 mils of boiling water, and 34 mils of boiling alcohol; very slightly soluble in ether.

Its saturated solutions are alkaline to litmus and are lævorotatory.

Sulphuric Acid containing 1 per cent. of ammonium vanadate produces with Strychnine a deep violet-blue color, changing to a deep purple, and finally to a cherry-red.

A solution of about 0.1 Gm. of Strychnine in 2 mils of sulphuric acid is not more than pale yellow (*readily carbonizable organic impurities*), but on adding a fragment of potassium dichromate, a deep blue color is momentarily produced, changing to deep violet, then to purplish-red, cherry-red, and finally to orange or yellow.

Incinerate about 1 Gm. of Strychnine; not more than 0.1 per cent. of ash remains.

One mil of a mixture of equal volumes of nitric acid and distilled water, added to about 0.1 Gm. of Strychnine, may produce a yellow, but not a red or reddish color (*brucine*).

AVERAGE DOSE—Metric, 0.0015 Gm.—Apothecaries, 1/40 grain.

STRYCHNINÆ NITRAS

Strychnine Nitrate

Strych. Nit.

The nitrate [$C_{21}H_{22}O_2N_2.HNO_3 = 397.21$] of the alkaloid strychnine. Preserve it in well-closed containers, protected from light.

Strychnine Nitrate occurs in colorless, glistening needles, or as a white, crystalline powder; odorless, permanent in the air. *Great caution must be used in tasting it and then only in very dilute solutions* which are exceedingly bitter.

One Gm. of Strychnine Nitrate dissolves in 42 mils of water, 150 mils of alcohol, 50 mils of glycerin, and in 105 mils of chloroform at 25° C.; also in 9 mils of boiling water and 77 mils of alcohol at 60° C.; insoluble in ether.

Its saturated aqueous solution is neutral or only slightly acid to litmus and is lævorotatory.

A solution of the salt, when poured carefully into a test tube upon a layer of sulphuric acid containing diphenylamine in solution, develops a blue color at the zone of contact.

When the salt is heated with hydrochloric acid, a bright red color is produced.

In other respects it responds to the tests for identity and purity under *Strychnina*.

AVERAGE DOSE—Metric, 0.0015 Gm.—Apothecaries, 1/40 grain.

STRYCHNINÆ SULPHAS

Strychnine Sulphate

Strych. Sulph.

The sulphate [$(C_{21}H_{22}O_2N_2)_2.H_2SO_4 + 5H_2O = 856.56$] of the alkaloid strychnine. Preserve it in well-closed containers.

Strychnine Sulphate occurs in colorless or white, prismatic crystals, or as a white, crystalline powder; odorless, and efflorescent in dry air. *Great caution* *must be used in tasting it and then only in very dilute solutions* which are exceedingly bitter.

One Gm. of Strychnine Sulphate dissolves in 32 mils of water, 81 mils of alcohol and in 220 mils of chloroform at 25° C.; also in 7 mils of boiling water and 26 mils of alcohol at 60° C.; freely soluble in glycerin; insoluble in ether.

Its saturated aqueous solution (1 in 50) is neutral or only slightly acid to litmus.

Barium chloride T.S. produces in a solution of the salt a white precipitate, insoluble in hydrochloric acid.

When dried to constant weight at 100° C. it loses not more than 11 per cent. of its weight.

In other respects Strychnine Sulphate responds to the tests for identity and purity under *Strychnina*.

AVERAGE DOSE—Metric, 0.0015 Gm.—Apothecaries, 1/40 grain.

STYRAX

Storax

Liquid Storax

A balsam obtained from the wood and inner bark of *Liquidambar orientalis* Miller (Fam. *Hamamelidaceæ*).

Storax is a semi-liquid, grayish, sticky, opaque mass, depositing on standing a heavy, dark brown stratum; transparent in thin layers, and having a characteristic odor and an acrid taste. It is heavier than water.

It is insoluble in water, but completely soluble (with the exception of accidental impurities) in an equal weight of warm alcohol; almost completely soluble in ether, acetone, benzene, or carbon disulphide.

When heated on a water-bath, Storax becomes more fluid, and if it is then agitated with warm, purified petroleum benzin, the supernatant liquid, on being decanted and allowed to cool, is not darker than pale yellow and deposits white crystals of cinnamic acid and cinnamic esters. The separated crystals evolve the odor of benzaldehyde when heated with diluted sulphuric acid and potassium permanganate.

Incinerate about 0.5 Gm. of Storax; not more than 1 per cent. of ash remains.

Dissolve about 10 Gm. of Storax, accurately weighed, in 20 mils of hot alcohol; the undissolved residue, after washing it on a filter with hot alcohol and drying at 100° C., does not exceed 2.5 per cent. The combined filtrate and washings, after the evaporation of the alcohol at a temperature not exceeding 60° C. and drying the residue for one hour at 100° C., leave a brown, transparent, semi-liquid product representing not less than 60 per cent. of the weight of Storax taken; this product is soluble in ether, with the exception of a few flakes, but only partially soluble in purified petroleum benzin.

Dissolve about 1 Gm. of Storax, purified as described above, and accurately weighed, in 50 mils of alcohol, add 0.5 mil of phenolphthalein T.S., and titrate with half-normal alcoholic potassium hydroxide V.S. The acid value so obtained is not less than 56 nor more than 85 (see Part II, Test No. 10).

Mix about 1 Gm. of Storax, purified as described, and accurately weighed, in a 250 mil flask with 50 mils of purified petroleum benzin, add 25 mils of half normal alcoholic potassium hydroxide V.S. and allow the mixture to stand twenty-four hours, with frequent shaking. Then add 0.5 mil of phenolphthalein T.S. and titrate with half-normal hydrochloric acid V.S. It shows a saponification value of not less than 170 nor more than 230 (see Part II, Test No. 9).

Preparation—Tinctura Benzoini Composita.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

SULPHONETHYLMETHANUM

Sulphonethylmethane

Sulphonethylmeth.—Trional

Diethylsulphonemethylethylmethane [$C_8H_{18}S_2O_4$ or $(CH_3)(C_2H_5)C(SO_2C_2H_5)_2 = 242.28$]. Preserve it in well-closed containers.

Sulphonethylmethane occurs in colorless, lustrous, odorless, crystalline scales, which have a bitter taste in aqueous solution.

One Gm. of Sulphonethylmethane dissolves in 200 mils of water at 25° C.; more soluble in boiling water; soluble in alcohol or ether.

Its saturated aqueous solution is neutral to litmus.

It melts between 74° and 76° C.; at a higher temperature it is decomposed with the evolution of sulphur dioxide.

Heat about 0.1 Gm. of Sulphonethylmethane with an equal weight of powdered charcoal in a dry test tube; the characteristic, unpleasant odor of mercaptan is developed.

Incinerate about 2 Gm. of Sulphonethylmethane; not more than 0.05 per cent. of ash remains.

About 1 Gm. of Sulphonethylmethane dissolved in 50 mils of boiling distilled water develops no odor. Ten mil portions of this solution, after cooling and filtering, when tested separately, show no turbidity at once on the addition of a few drops of barium chloride T.S. (*sulphate*) or a few drops of silver nitrate T.S. (*chloride*).

Twenty mils of the cold filtrate from the preceding test does not at once decolorize 0.05 mil of tenth-normal potassium permanganate V.S. (*readily oxidizable impurities*).

Average dose—Metric, 0.75 Gm.—Apothecaries, 12 grains.

SULPHONMETHANUM

Sulphonmethane

Sulphonmeth.—Sulphonal

Diethylsulphonedimethylmethane [$C_7H_{16}S_2O_4$ or $(CH_3)_2C(SO_2C_2H_5)_2 = 228.27$]. Preserve it in well-closed containers.

Sulphonmethane occurs in colorless, inodorous, and nearly tasteless prismatic crystals, or as a crystalline powder.

One Gm. of Sulphonmethane dissolves in 365 mils of water, 60 mils of alcohol, 11 mils of chloroform, and in 64 mils of ether at 25° C.; also in 16 mils of boiling water and 3 mils of boiling alcohol; soluble in benzene.

It melts between 124° and 126° C.

In other respects it responds to the tests for identity and purity under *Sulphonethylmethanum.*

Average dose—Metric, 0.75 Gm.—Apothecaries, 12 grains.

SULPHUR LOTUM

Washed Sulphur

Sulphur Lot.

Washed Sulphur, when dried to constant weight in a desiccator over sulphuric acid, contains not less than 99.5 per cent. of S (32.07).

Sublimed Sulphur, *one hundred grammes*	100 Gm.
Ammonia Water, *ten milliliters*	10 mils
Water, *a sufficient quantity.*	

Pass the sublimed sulphur through a No. 30 sieve, mix it thoroughly with *one hundred mils* of water, add the ammonia water and set the mixture aside for three days in a closed vessel, agitating occasionally. Then add *one hundred mils* of water, transfer the mixture to a strainer, and wash the sulphur with water until the washings cease to impart a blue color to red litmus paper. Then allow it to drain, press the residue strongly, dry it rapidly at a moderate heat in a drying closet, pass it through a No. 30 sieve, and keep it in well-closed containers.

Washed Sulphur is a fine, yellow powder, without odor or taste.

It responds to the solubility and identity tests under *Sulphur Sublimatum.*

Agitate 2 Gm. of Washed Sulphur with 10 mils of distilled water and filter; the filtrate is neutral to litmus (*acid or alkali*).

The amount of residue left after volatilizing or igniting a weighed portion of dried Washed Sulphur does not exceed 0.5 per cent.

Digest 0.5 Gm. of Washed Sulphur for three hours with 10 mils of ammonia water, filter the liquid, and evaporate the clear filtrate to dryness on a water bath. Then add 1 mil of nitric acid, and again evaporate to dryness. This residue meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Assay—When dried to constant weight in a desiccator over sulphuric acid and assayed by the method under *Sulphur Sublimatum,* it shows, in the dried product, not less than 99.5 per cent. of S.

Each gramme of Washed Sulphur, previously dried, corresponds to not less than 7.243 Gm. of barium sulphate.

Preparation—Pulvis Glycyrrhizæ Compositus.

Average dose—Metric, 4 Gm.—Apothecaries, 1 drachm.

SULPHUR PRÆCIPITATUM

Precipitated Sulphur

Sulphur Præc.—Lac Sulphuris Milk of Sulphur

Precipitated Sulphur, when dried to constant weight in a desiccator over sulphuric acid, contains not less than 99.5 per cent. of S (32.07).

Sublimed Sulphur, *one hundred grammes*	100 Gm.
Calcium Oxide, *fifty grammes*	50 Gm.
Hydrochloric Acid,	
Water, each, *a sufficient quantity.*	

Slake the calcium oxide, and mix it thoroughly with *five hundred mils* of water. Add the sublimed sulphur, previously sifted, and, after thorough mixing, add *one thousand mils* of water and boil the mixture in a porcelain or glass vessel during one hour, stirring or agitating the mixture very frequently, and replacing the water lost by evaporation. Then cover the vessel, and permit the contents to cool and become clear by subsidence. Carefully draw off the clear solution, and filter the remainder. To the united liquids add gradually and with constant stirring hydrochloric acid previously diluted with an equal volume of water, until the liquid is nearly neutralized but still retains an alkaline reaction and a yellow color. Collect the precipitate on a strainer, and wash it until the washings are neutral to litmus and cease to give a precipitate upon the addition of ammonium oxalate T.S. Then dry the product rapidly, and keep it in well-closed containers.

Precipitated Sulphur is a fine, amorphous powder, of a pale yellow color, without odor or taste.

Agitate 2 Gm. of Precipitated Sulphur with 10 mils of distilled water and filter; the filtrate is neutral to litmus (*acid or alkali*).

It responds to the solubility and identity tests under *Sulphur Sublimatum.* It is more readily and completely soluble in carbon disulphide than other forms of sulphur.

The amount of residue left after volatilizing or igniting a weighed portion of dried Precipitated Sulphur does not exceed 0.3 per cent.

Digest 1 Gm. of Precipitated Sulphur for three hours with 10 mils of ammonia water and filter the liquid. Evaporate the clear filtrate to dryness on a water bath, add 1 mil of nitric acid, and again evaporate to dryness. This residue meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Assay—When dried to constant weight in a desiccator over sulphuric acid and assayed by the method under *Sulphur Sublimatum,* it shows, in the dried product, not less than 99.5 per cent. of S.

Each gramme of Precipitated Sulphur, previously dried, corresponds to not less than 7.243 Gm. of barium sulphate.

AVERAGE DOSE—Metric, 4 Gm.—Apothecaries, 1 drachm.

SULPHUR SUBLIMATUM

Sublimed Sulphur

Sulphur Sublim.—Flowers of Sulphur

It contains, when dried to constant weight in a desiccator over sulphuric acid, not less than 99.5 per cent. of S (32.07).

Sublimed Sulphur is a fine, yellow powder, having a slight, characteristic odor, and a faintly acid taste.

Sublimed Sulphur is practically insoluble in water and nearly insoluble in alcohol; it is slightly soluble in ether; soluble or partially soluble in carbon disulphide, chloroform, or olive oil.

At about 115° C. it fuses to a yellow, mobile fluid, which upon further heating becomes dark and viscid. In the air it burns to sulphur dioxide, characterized by its odor.

The amount of residue left after volatilizing or igniting a weighed portion of well-dried Sublimed Sulphur does not exceed 0.5 per cent.

Assay—Transfer about 1 Gm. of Sublimed Sulphur, previously dried to constant weight in a desiccator over sulphuric acid and accurately weighed, to a flask containing 50 mils of a 10 per cent. solution of potassium hydroxide. Boil the mixture until the liquid is of a transparent, golden-yellow color and then dilute it with distilled water to make a volume of exactly 250 mils. Oxidize 25 mils of this diluted solution by the addition of solution of hydrogen dioxide in excess (using about 50 mils), and heat on a water bath for thirty minutes. Then acidulate the liquid with hydrochloric acid, and dilute it with 100 mils of distilled water. Now heat it to boiling and add hot barium chloride T.S., in small portions, to the resulting liquid until no further precipitation takes place. Heat this mixture on a water bath for thirty minutes, collect the resulting precipitate on a filter, wash, dry, ignite, and weigh the barium sulphate. Carry out a blank determination, using the same amount of all of the reagents but omitting the Sulphur, and before making the final calculation deduct the amount of barium sulphate thus obtained from that obtained in the assay. It shows, in the dried product, not less than 99.5 per cent. of S.

Each gramme of Sublimed Sulphur, previously dried, corresponds to not less than 7.243 Gm. of barium sulphate.

Preparation—Unguentum Sulphuris.

AVERAGE DOSE—Metric, 4 Gm.—Apothecaries, 1 drachm.

SUMBUL

Sumbul

Musk-root

The rhizome and roots of *Ferula Sumbul* (Kauffmann) Hooker filius (Fam. *Umbelliferæ*).

In transverse segments, attaining a length of 10 cm. and a diameter of 7 cm.; externally light brown to dark brown, longitudinally wrinkled and showing in the upper portions a smooth, grayish, epidermal layer, occasionally with the short stem-bases attached; fracture short, fibrous, spongy; internally light yellow or brownish-yellow, arrangement of wood irregular and with yellowish-brown or blackish resinous patches frequently extending over the entire ends of the segments; odor peculiar, musk-like; taste bitter and somewhat aromatic.

The powder is grayish-brown; when examined under the microscope it exhibits numerous, irregular, brownish-black fragments and well-defined isolated tracheæ, the latter with distinct end-walls, and mostly with reticulate thickenings and from 0.03 to 0.1 mm. in width; occasional fragments of polygonal epidermal cells with yellowish-brown walls; numerous, nearly colorless, yellowish-brown and reddish-brown fragments consisting of a granular substance in which the cellular structure is not well defined; long, narrow fragments consisting of more or less collapsed leptome or sieve tissue; occasional fragments of well-defined parenchyma with a few, nearly spherical starch grains, from 0.003 to 0.012 mm. in diameter.

Preparations—Extractum Sumbul   Fluidextractum Sumbul.

AVERAGE DOSE—Metric, 2 Gm.—Apothecaries, 30 grains.

SUPPOSITORIA

Suppositories

Suppositories are solid bodies of various weights and shapes, adapted for introduction into the different orifices of the human body, and melting or softening at body heat. The vehicles usually employed are oil of theobroma, glycerinated gelatin, or sodium stearate.

For suppositories made with oil of theobroma the following general processes may be employed:

Take of
The Medicinal Substance, *the prescribed quantity.*
Oil of Theobroma, grated, *a sufficient quantity.*

Reduce the medicinal substance, if dry, to a very fine powder, or, if an extract, soften it with an appropriate liquid, then mix it thoroughly in a mortar with about an equal weight of grated oil of theobroma, and incorporate the remainder of the oil of theobroma until a homogeneous, plastic mass is obtained, adding, if necessary, a small quantity of expressed oil of almond. Roll the mass on a graduated tile until a cylinder of the proper length is formed, divide this into the required number of equal parts, and with a spatula, or other mechanical aid, form them into the desired shape.

If the process of cold compression is preferred, mix the medicinal substance in a suitable mortar with about an equal weight of grated oil of theobroma, as above directed, then thoroughly incorporate it with the remainder of the oil of theobroma, previously finely grated, chilling the mortar, if necessary, to preserve the pulverulent form of the mixture. Transfer the powdered mass to the cylinder of an appropriate suppository compresser and by the use of this apparatus prepare the desired number of compressed suppositories.

If the process of fusion is preferred, mix the medicinal substance with about an equal weight of grated oil of theobroma, as above directed, then thoroughly incorporate it with the remainder of the oil of theobroma, previously melted by a gentle heat, in a suitable vessel provided with a lip; then allow it to cool to about 38° C., and, when the mixture begins to congeal, pour it immediately into suitable well-cooled moulds. Keep the moulds at a freezing temperature until the suppositories have hardened and are ready to be removed.

For suppositories containing hydrated chloral, phenol, or other substances which soften the vehicle, raise the melting point of the oil of theobroma by the addition of from 10 to 15 per cent. of spermaceti, but the melting point must not be raised above 37° C.

For suppositories made with glycerinated gelatin the following process may be used:

Take of
THE MEDICINAL SUBSTANCE, *the prescribed quantity.*
GLYCERINATED GELATIN,
GLYCERIN,
WATER, each, *a sufficient quantity.*

Mix the medicinal substance, if solid and soluble in water or glycerin, or if a miscible liquid, with a little water, and add sufficient glycerin to make the weight of the mixture one-half that of the finished mass. Then thoroughly incorporate it with an equal weight of melted glycerinated gelatin, and pour it at once into suitable moulds which have been greased with a small quantity of petrolatum. Cool the moulds thoroughly before removing the suppositories. Moulds for urethral suppositories should be warmed sufficiently before pouring the mass to facilitate the proper filling of the mould. Suppositories having a firmer consistence may be prepared by substituting mucilage of acacia for a portion of the water or glycerin.

If the medicinal substance is insoluble in water or glycerin, thoroughly levigate it in a warm mortar with a sufficient quantity of glycerin to make the weight of the mixture one-half that of the finished mass. Then thoroughly incorporate it with an equal weight of melted glycerinated gelatin, and pour it into suitable moulds as above directed. With bulky powders about one-half of the glycerin may be replaced with water before levigation.

Glycerinated gelatin suppositories should be protected against the effects of heat, moisture and dry air by keeping them in tightly-closed containers in a cool place.

Rectal Suppositories should be cone-shaped, and when made from oil of theobroma should weigh about *two grammes.*

Urethral Suppositories (*Bougies*) should be pencil-shaped, pointed at one extremity, and either *seven centimeters* in length, weighing about *two grammes,* or *fourteen centimeters* in length, weighing about *four grammes,* when made with glycerinated gelatin. If prepared with oil of theobroma they should weigh about one-half the above quantities.

Vaginal Suppositories should be globular or oviform in shape, and weigh about *ten grammes* if made with glycerinated gelatin, and about *four grammes* if made with oil of theobroma.

SUPPOSITORIA GLYCERINI

Suppositories of Glycerin

Supp. Glycerin.

GLYCERIN, *thirty grammes*	30.0 Gm.
MONOHYDRATED SODIUM CARBONATE, *five-tenths of a gramme*	0.5 Gm.
STEARIC ACID, *two grammes*	2.0 Gm.
WATER, *five milliliters*	5.0 mils
To make *ten rectal suppositories*	10

Dissolve the monohydrated sodium carbonate in the water and add it to the glycerin contained in a suitable vessel placed in a water bath in such a way that the vessel is well down in the boiling water and its contents protected as much as possible from the steam of the bath. Add the stearic acid and heat the mixture for fifteen minutes or until the carbon dioxide ceases to be evolved, and the liquid is clear. Then pour the melted mass into suitable moulds, remove the suppositories when they are completely cold, and preserve them in tightly-stoppered glass vessels in a cool place.

SUPRARENALUM SICCUM

Dried Suprarenals

Supraren. Sicc.—Glandulæ Suprarenales Siccæ U.S.P. VIII
Desiccated Suprarenal Glands

The suprarenal glands of animals which are used for food by man, cleaned, dried, freed from fat, and powdered, and containing not less than 0.4 per cent. nor more than 0.6 per cent. of epinephrine, the active principle of the suprarenal gland. One part of Dried Suprarenals represents approximately 6 parts of fresh glands, free from fat. If assayed biologically *one gramme* of Dried Suprarenals contains the equivalent of *ten milligrammes* of lævo-methylamino-ethanol-catechol.

A light yellowish-brown, amorphous powder, having a slight, characteristic odor; partially soluble in water.

Dried Suprarenals contain not more than 7 per cent. of moisture, and the yield of ash does not exceed 7 per cent.

Assay—Add 0.005 Gm. of finely powdered manganese dioxide and 10 mils of distilled water to 0.01 Gm. of Dried Suprarenals; thoroughly shake the mixture several times during one hour and filter. Compare the color of the filtrate in a test tube or in any convenient manner, with the color of cobaltous chloride T.S. and diluted gold chloride T.S. (see Reagents, Part II) combined as follows: Mix 1.85 mils of cobaltous chloride T.S. with 0.95 mil of diluted gold chloride T.S. and 7.2 mils of distilled water; the color corresponds to 0.2 per cent. of epinephrine in the filtrate obtained above 2.95 mils of cobaltous chloride T.S. with 1.25 mils of diluted gold chloride T.S. and 5.8 mils of distilled water corresponds in color to 0.4 per cent. of epinephrine; 4.05 mils of cobaltous chloride T.S. with 1.35 mils of diluted gold chloride T.S. and 4.6 mils of distilled water corresponds in color to 0.6 per cent. of epinephrine; 5.15 mils of cobaltous chloride T.S. with 1.55 mils of diluted gold chloride T.S. and 3.3 mils of distilled water corresponds in color to 0.8 per cent. of epinephrine.

The percentages of epinephrine indicated by the above color standards are based upon the maceration of 0.01 Gm. of the Dried Suprarenals in 10 mils of distilled water, as directed above, and filtering. In samples containing more than 0.8 per cent. of epinephrine, 0.005 Gm. of the Dried Suprarenals may be taken, in which case the percentage stated above, as indicated by the color standards, should be doubled. The standard color solutions keep unchanged, if sealed in glass tubes.

For a method of assaying Dried Suprarenals see Biological Assays (Part II).

AVERAGE DOSE—Metric, 0.25 Gm.—Apothecaries, 4 grains.

SYRUPUS

Syrup

Sirup Simple Syrup

SUGAR, in dry, crystalline granules, *eight hundred and fifty grammes*..	850 Gm.
DISTILLED WATER, *a sufficient quantity,*	
To make *one thousand milliliters*...........	1000 mils

Place at the bottom of a glass percolator of suitable size, a layer of purified cotton about one-half inch in thickness, well fitted to the sides of the percolator, and moisten it with a little distilled water. Introduce the sugar into the percolator, make its surface level without shaking or jarring, then carefully pour upon it *four hundred and fifty mils* of distilled water and regulate the flow of the liquid, if necessary, so that it passes out in rapid drops. Return the first portion of the percolate until it runs through clear and, when all of the liquid has passed, follow it by distilled water, added in portions, so that all of the sugar may be dissolved and the product measure *one thousand mils.* Mix thoroughly.

Syrup may also be prepared in the following manner:

Dissolve the sugar with the aid of heat in *four hundred and fifty mils* of distilled water, raise the temperature to the boiling point, strain the liquid, and pass enough distilled water through the strainer to make the product, when cold, measure *one thousand mils.* Mix thoroughly.

Syrup thus prepared has a specific gravity of about 1.313 at 25° C.

Preparation—Elixir Aromaticum. Also used in other preparations.

SYRUPUS ACACIÆ

Syrup of Acacia

Syr. Acac.

Acacia, in selected pieces, *one hundred grammes*	100 Gm.
Sugar, *eight hundred grammes*	800 Gm.
Distilled Water, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Place the acacia in an enameled or porcelain dish, add *four hundred and thirty mils* of distilled water, and stir occasionally until the acacia is dissolved; then, having added the sugar, place the dish on a water bath and apply heat, gradually increasing the temperature until the water in the water bath boils. Maintain this temperature for fifteen minutes, and stir the syrup from time to time until the sugar is dissolved. Strain the Syrup while hot, add sufficient distilled water, recently boiled, to make the product measure *one thousand mils,* and transfer it, while yet hot, into small bottles which have been rinsed with boiling water and heated in an oven at 160° C. for from fifteen to thirty minutes. Close the bottles tightly with rubber stoppers which have been just previously boiled in water for thirty minutes and cap them with paper.

SYRUPUS ACIDI CITRICI

Syrup of Citric Acid

Syr. Acid. Cit.

Citric Acid, *ten grammes*	10 Gm.
Distilled Water, *ten milliliters*	10 mils
Tincture of Lemon Peel, *ten milliliters*	10 mils
Syrup, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Dissolve the citric acid in the distilled water and add the solution to *nine hundred and fifty mils* of syrup, mixing it well. Then add the tincture of lemon peel, shake the mixture, and add enough syrup to make the product measure *one thousand mils.* Mix thoroughly and preserve it in containers which have been previously washed with boiling water.

This preparation must not be dispensed unless it is free from moulds and fermentation products.

SYRUPUS ACIDI HYDRIODICI

Syrup of Hydriodic Acid

Syr. Acid. Hydriod.

One hundred mils of Syrup of Hydriodic Acid contains not less than 1.3 Gm. nor more than 1.45 Gm. of HI (127.93).

Diluted Hydriodic Acid, *one hundred and twenty-five milliliters*	125 mils
Distilled Water, *three hundred milliliters*	300 mils
Syrup, *five hundred and seventy-five milliliters*	575 mils
To make *one thousand milliliters*	1000 mils

Mix them.

A transparent, colorless, or not more than pale straw-colored, syrupy liquid; odorless, and having a sweet and acidulous taste.

Specific gravity: about 1.215 at 25° C.

Mix 5 mils of Syrup of Hydriodic Acid with a few drops of starch T.S. and add three drops of chlorine water; the liquid acquires a deep blue color. No blue color is produced in the Syrup by starch T.S. alone (*free iodine*).

Assay—Introduce exactly 25 mils of Syrup of Hydriodic Acid into a flask, dilute it with 100 mils of distilled water, add 40 mils of tenth-normal silver nitrate V.S., agitate the mixture, add 5 mils of diluted nitric acid and 2 mils of ferric ammonium sulphate T.S. and titrate with tenth-normal potassium sulphocyanate V.S. It shows, in each 100 mils, not less than 1.3 Gm. nor more than 1.45 Gm. of HI.

Each mil of tenth-normal silver nitrate V.S. used corresponds to 0.012793 Gm. of HI.

Average dose—Metric, 4 mils—Apothecaries, 1 fluidrachm.

SYRUPUS AURANTII

Syrup of Orange

Syr. Aurant.

Tincture of Sweet Orange Peel, *fifty milliliters*	50 mils
Citric Acid, *five grammes*	5 Gm.
Purified Talc, *fifteen grammes*	15 Gm.
Sugar, *eight hundred and twenty grammes*	820 Gm.
Distilled Water, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Triturate the purified talc in a mortar with the tincture, add gradually *four hundred mils* of distilled water, filter, and add sufficient distilled water through the filter to obtain *four hundred and fifty mils* of filtrate; in this filtrate dissolve the citric acid and sugar by agitation without heat, and add sufficient distilled water to make the product measure *one thousand mils.* Mix thoroughly.

SYRUPUS AURANTII FLORUM

Syrup of Orange Flowers

Syr. Aurant. Flor.

Sugar, *eight hundred and fifty grammes*....	850 Gm.
Orange Flower Water, *a sufficient quantity,*	
To make *one thousand milliliters*..........	1000 mils

Dissolve the sugar in *four hundred and fifty mils* of orange flower water by agitation, without heat, add enough orange flower water to make the product measure *one thousand mils,* mix thoroughly and strain.

Syrup of Orange Flowers may also be made in the following manner: Prepare a percolator in the manner described under *Syrupus.* Pour *four hundred and fifty mils* of orange flower water upon the sugar, return the first portions of the percolate until it runs through clear and, when all of the liquid has passed, follow it by orange flower water, until the sugar is all dissolved and the product measures *one thousand mils.* Mix thoroughly.

SYRUPUS CALCII LACTOPHOSPHATIS

Syrup of Calcium Lactophosphate

Syr. Calc. Lactophos.

Precipitated Calcium Carbonate, *twenty-five grammes*	25 Gm.
Lactic Acid, *sixty milliliters*.........................	60 mils
Phosphoric Acid, *thirty-six milliliters*.................	36 mils
Stronger Orange Flower Water, *fifty milliliters*....	50 mils
Sugar, *six hundred and fifty grammes*..................	650 Gm.
Glycerin, *fifty milliliters*...........................	50 mils
Distilled Water, *a sufficient quantity,*	
To make *one thousand milliliters*...........	1000 mils

To the lactic acid, mixed with *one hundred mils* of distilled water, gradually add the calcium carbonate, stirring until solution is effected. Then add the phosphoric acid, previously diluted with *fifty mils* of distilled water, and stir until the precipitate first formed is dissolved. Add *one hundred mils* of distilled water, filter the solution, mix the stronger orange flower water with the filtrate, add the glycerin, and dissolve the sugar in the mixed liquids by agitation; then add enough distilled water to make the product measure *one thousand mils* and strain.

Average dose—Metric, 10 mils—Apothecaries, 2½ fluidrachms.

SYRUPUS FERRI IODIDI

Syrup of Ferrous Iodide

Syr. Ferr. Iod.—Ferri iodidi syrupus P. I.

A syrupy liquid containing not less than 4.75 per cent. nor more than 5.25 per cent. of FeI_2 (309.68). Preserve it in completely filled, tightly-stoppered bottles.

Iron, in the form of fine, bright wire and cut into small pieces, *twelve and five-tenths grammes*	12.5 Gm.
Iodine, *forty-one and five-tenths grammes*	41.5 Gm.
Diluted Hypophosphorous Acid, *twenty milliliters*	20.0 mils
Sugar, *five hundred and seventy-five grammes*	575.0 Gm.
Distilled Water, *a sufficient quantity,*	
To make *one thousand grammes*	1000 Gm.

Introduce the iron and iodine into a flask of thin glass, having a capacity of about *five hundred mils,* and add to it *one hundred and fifty mils* of distilled water. Shake the mixture occasionally, checking the reaction, if necessary, by placing the flask in cold water, and, when the solution has acquired a greenish color and has lost the odor of iodine, heat it to boiling and add at once *fifty grammes* of the sugar; when this has dissolved, filter the solution into the remainder of the sugar contained in a porcelain dish. Rinse the flask and iron wire with *one hundred and twenty-five mils* of distilled water and pass the washings through the filter into the sugar. Stir the mixture with a glass rod or a porcelain spatula, heating the liquid on a water bath until complete solution is effected, and, having passed the syrup through a clean muslin strainer into a tared bottle, add the diluted hypophosphorous acid and sufficient distilled water to make the product weigh *one thousand grammes.*

A transparent, pale yellowish-green, syrupy liquid, having a sweet, strongly ferruginous taste and a slightly acid reaction.

Specific gravity: about 1.35 at 25° C.

Add a few drops of potassium ferricyanide to 5 mils of Syrup of Ferrous Iodide; a blue precipitate is produced.

Mix 5 mils of Syrup of Ferrous Iodide with a few drops of starch T.S. and add three drops of chlorine water; the liquid acquires a deep blue color. No blue color is produced in the Syrup by starch T.S. alone (*free iodine*).

Assay—Dilute about 10 Gm. of Syrup of Ferrous Iodide, accurately weighed, with 30 mils of distilled water, add 50 mils of tenth-normal silver nitrate V.S., and 5 mils of nitric acid and heat on a water bath until the precipitate of silver iodide is yellow. Cool, add 2 mils of ferric ammonium sulphate T.S., and determine the residual silver nitrate by titration with tenth-normal potassium sulphocyanate V.S. It shows not less than 4.75 per cent. nor more than 5.25 per cent. of FeI_2.

Each mil of tenth-normal silver nitrate V.S. used corresponds to 0.015484 Gm. of FeI_2. Each gramme of Syrup of Ferrous Iodide corresponds to not less than 3.07 mils nor more than 3.4 mils of tenth-normal silver nitrate V.S.

Average dose—Metric, 1 mil—Apothecaries, 15 minims.

SYRUPUS HYPOPHOSPHITUM

Syrup of Hypophosphites

Syr. Hypophos.

Calcium Hypophosphite, *forty-five grammes*	45 Gm.
Potassium Hypophosphite, *fifteen grammes*	15 Gm.
Sodium Hypophosphite, *fifteen grammes*	15 Gm.
Diluted Hypophosphorous Acid, *two milliliters*	2 mils
Glycerin, *fifty milliliters*	50 mils
Sugar, *six hundred grammes*	600 Gm.
Distilled Water, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Triturate the hypophosphites with *five hundred mils* of distilled water, until they are dissolved. Add the diluted hypophosphorous acid, filter the liquid and pass enough distilled water through the filter to make the filtrate measure *five hundred and forty mils*. To this add the glycerin and sugar, dissolve the latter by agitation without heat, and finally add enough distilled water, through the filter, to make the product measure *one thousand mils*. Strain if necessary.

Average dose—Metric, 10 mils—Apothecaries, 2½ fluidrachms.

SYRUPUS IPECACUANHÆ

Syrup of Ipecac

Syr. Ipecac.

Fluidextract of Ipecac, *seventy milliliters*	70 mils
Acetic Acid, *ten milliliters*	10 mils
Glycerin, *one hundred milliliters*	100 mils
Sugar, *seven hundred grammes*	700 Gm.
Water, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Dilute the fluidextract of ipecac with *three hundred mils* of water to which the acetic acid has previously been added, and mix them thoroughly by shaking and set the liquid aside in a cool place for twenty-four hours. Then filter, and pass enough water through the filter to make the filtrate measure *four hundred and fifty mils*. To this filtrate add the glycerin, dissolve the sugar in the mixed liquids, and add enough water to make the product measure *one thousand mils*. Mix thoroughly and strain, if necessary.

Syrup of Ipecac may also be made in the following manner:

Prepare a percolator in the manner described under *Syrupus*. Mix the filtrate obtained as directed in the preceding formula with the glycerin, pour the mixture upon the sugar, return the first portions of the percolate until it runs through clear, and, when all the liquid has passed, follow it with water until the sugar is all dissolved and the product measures *one thousand mils*. Mix thoroughly.

		Metric	Apothecaries
AVERAGE DOSE—	Expectorant,	1 mil —	15 minims.
	Emetic,	15 mils—	4 fluidrachms.

SYRUPUS LACTUCARII

Syrup of Lactucarium

Syr. Lactucar.

TINCTURE OF LACTUCARIUM, *one hundred milliliters*	100 mils
GLYCERIN, *two hundred milliliters*	200 mils
CITRIC ACID, *one gramme*	1 Gm.
ORANGE FLOWER WATER, *fifty milliliters*	50 mils
SYRUP, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Mix the tincture of lactucarium with the glycerin, add the orange flower water in which the citric acid has been previously dissolved, and filter, if necessary. Finally, add a sufficient quantity of syrup to make the product measure *one thousand mils*. Mix thoroughly.

AVERAGE DOSE—Metric, 10 mils—Apothecaries, 2½ fluidrachms.

SYRUPUS PICIS LIQUIDÆ

Syrup of Tar

Syr. Pic. Liq.

TAR, *five grammes*	5 Gm.
ALCOHOL, *fifty milliliters*	50 mils
MAGNESIUM CARBONATE, *ten grammes*	10 Gm.
SUGAR, *eight hundred and fifty grammes*	850 Gm.
WATER, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Dissolve the tar in the alcohol, add the magnesium carbonate and *fifty grammes* of sugar, and after thorough trituration add *four hundred and ten mils* of water. Stir the mixture occasionally during two hours and then filter it, returning the filtrate to the filter until the liquid is clear.

Dissolve the remainder of the sugar in the clear filtrate obtained from the treatment of the tar, and strain the syrup, adding sufficient water through the strainer to make the product measure *one thousand mils.*

Syrup of Tar may also be made in the following manner:

Prepare a percolator in the manner described under *Syrupus.* Pour the clear filtered liquid obtained from the treatment of the tar as directed above upon the remainder of the sugar, return the first portions of the percolate until it runs through clear, and, when all the percolate has passed, follow it with water until the sugar is all dissolved and the product measures *one thousand mils.* Mix thoroughly.

AVERAGE DOSE—Metric, 4 mils—Apothecaries, 1 fluidrachm.

SYRUPUS PRUNI VIRGINIANÆ

Syrup of Wild Cherry

Syr. Prun. Virg.

WILD CHERRY BARK, in No. 20 powder, *one hundred and fifty grammes*	150 Gm.
SUGAR, *eight hundred grammes*	800 Gm.
GLYCERIN, *fifty milliliters*	50 mils
WATER, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Mix the glycerin with *two hundred mils* of water, moisten the wild cherry bark with *one hundred mils* of this mixture, pack it firmly in a cylindrical percolator and pour the remaining *one hundred and fifty mils* of the menstruum upon it. When the glycerin-water menstruum has disappeared from the surface of the drug, add sufficient water to saturate the powder and leave a stratum above it. Close the lower orifice, and, having closely covered the percolator, allow the drug to macerate for twenty-four hours. Then allow the percolation to proceed slowly, gradually adding water as a menstruum until the percolate measures *five hundred mils.* Dissolve the sugar in the percolate by agitation without heat, strain and pass enough water through the strainer to make the product measure *one thousand mils.* Mix thoroughly.

Syrup of Wild Cherry may also be made in the following manner:

Prepare a percolator in the manner described under *Syrupus*. Pour the percolate obtained as directed in the preceding formula upon the sugar, return the first portions of the percolate until it runs through clear, and, when all the liquid has passed, follow it with water, until the sugar is all dissolved and the product measures *one thousand mils*. Mix thoroughly.

This Syrup should be stored in non-metallic, tightly-closed containers, in a cool place, as it rapidly loses hydrocyanic acid even under the most favorable conditions.

AVERAGE DOSE—Metric, 4 mils—Apothecaries, 1 fluidrachm.

SYRUPUS RHEI

Syrup of Rhubarb

Syr. Rhei

FLUIDEXTRACT OF RHUBARB, *one hundred milliliters*	100 mils
SPIRIT OF CINNAMON, *four milliliters*	4 mils
POTASSIUM CARBONATE, *ten grammes*	10 Gm.
WATER, *fifty milliliters*	50 mils
SYRUP, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Mix the spirit of cinnamon with the fluidextract of rhubarb, add the potassium carbonate previously dissolved in the water, and gradually add this mixture to enough syrup to make the product measure *one thousand mils*.

AVERAGE DOSE—Metric, 10 mils—Apothecaries, 2½ fluidrachms.

SYRUPUS RHEI AROMATICUS

Aromatic Syrup of Rhubarb

Syr. Rhei Arom.—Spiced Syrup of Rhubarb

AROMATIC TINCTURE OF RHUBARB, *one hundred and fifty milliliters*	150 mils
POTASSIUM CARBONATE, *one gramme*	1 Gm.
SYRUP, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Dissolve the potassium carbonate in the tincture and add this to sufficient syrup to make the product measure *one thousand mils*. Mix thoroughly.

AVERAGE DOSE—Metric, 10 mils—Apothecaries, 2½ fluidrachms.

SYRUPUS SARSAPARILLÆ COMPOSITUS

Compound Syrup of Sarsaparilla

Syr. Sarsap. Co.

Fluidextract of Sarsaparilla, *two hundred milliliters*	200.0 mils
Fluidextract of Glycyrrhiza, *fifteen milliliters*	15.0 mils
Fluidextract of Senna, *fifteen milliliters*	15.0 mils
Oil of Sassafras, *two-tenths of a milliliter*	0.2 mil
Oil of Anise, *two-tenths of a milliliter*	0.2 mil
Methyl Salicylate, *two-tenths of a milliliter*	0.2 mil
Alcohol, *nineteen and four-tenths milliliters*	19.4 mils
Syrup, *seven hundred and fifty milliliters*	750.0 mils
To make about *one thousand milliliters*	1000 mils

Mix the fluidextracts and add the alcohol, in which the methyl salicylate and the oils have been dissolved. Gradually add this solution to the syrup and mix thoroughly.

Average dose—Metric, 15 mils—Apothecaries, 4 fluidrachms.

SYRUPUS SCILLÆ

Syrup of Squill

Syr. Scill.

Vinegar of Squill, *four hundred and fifty milliliters*	450 mils
Sugar, *eight hundred grammes*	800 Gm.
Water, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Dissolve the sugar in the vinegar of squill with the aid of a gentle heat, then strain the syrup, and, when the liquid is cold, add enough water, through the strainer, to make the product measure *one thousand mils.* Mix thoroughly.

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

SYRUPUS SCILLÆ COMPOSITUS

Compound Syrup of Squill

Syr. Scill. Co.—Hive Syrup

Fluidextract of Squill, *eighty milliliters*	80 mils
Fluidextract of Senega, *eighty milliliters*	80 mils

Antimony and Potassium Tartrate, *two grammes*	2 Gm.
Distilled Water, *ten milliliters*	10 mils
Syrup, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Dissolve the antimony and potassium tartrate in the distilled water with the aid of heat, add this solution to *seven hundred and fifty mils* of syrup and mix thoroughly. Then gradually add the fluidextracts, previously mixed, and, finally, sufficient syrup to make the product measure *one thousand mils.*

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

SYRUPUS SENEGÆ

Syrup of Senega

Syr. Seneg.

Fluidextract of Senega, *two hundred milliliters*	200 mils
Syrup, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Mix the fluidextract with sufficient syrup to make the product measure *one thousand mils.*

Average dose—Metric, 4 mils—Apothecaries, 1 fluidrachm.

SYRUPUS SENNÆ

Syrup of Senna

Syr. Senn.

Fluidextract of Senna, *two hundred and fifty milliliters.*	250 mils
Oil of Coriander, *five milliliters*	5 mils
Syrup, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Mix the oil of coriander with the fluidextract of senna and add sufficient syrup to make the product measure *one thousand mils.* Mix thoroughly.

Average dose—Metric, 4 mils—Apothecaries, 1 fluidrachm.

SYRUPUS TOLUTANUS

Syrup of Tolu

Syr. Tolu.

Tincture of Tolu, *fifty milliliters*	50 mils
Magnesium Carbonate, *ten grammes*	10 Gm.
Sugar, *eight hundred and twenty grammes*	820 Gm.
Water, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Rub the tincture of tolu in a mortar with the magnesium carbonate and *sixty grammes* of the sugar. Then gradually add *four hundred and thirty mils* of water, with constant trituration, and filter. Dissolve the remainder of the sugar in the clear filtrate, with the aid of a gentle heat, strain the syrup while hot, and add sufficient water to make the product measure *one thousand mils.*

Syrup of Tolu may also be made in the following manner:

Prepare a percolator in the manner described under *Syrupus.* Pour the filtrate obtained as directed in the preceding formula upon the remainder of the sugar, return the first portions of the percolate until it runs through clear, and, when all of the liquid has passed, follow it with water, until all of the sugar is dissolved and the product measures *one thousand mils.* Mix thoroughly.

Average dose—Metric, 15 mils—Apothecaries, 4 fluidrachms.

SYRUPUS ZINGIBERIS

Syrup of Ginger

Syr. Zingib.

Fluidextract of Ginger, *thirty milliliters*	30 mils
Alcohol, *twenty milliliters*	20 mils
Magnesium Carbonate, *ten grammes*	10 Gm.
Sugar, *eight hundred and twenty grammes*	820 Gm.
Water, a sufficient quantity,	
To make *one thousand milliliters*	1000 mils

Mix the fluidextract of ginger and the alcohol, then triturate the liquid in a mortar with the magnesium carbonate and *sixty grammes* of the sugar. Then gradually add *four hundred and thirty mils* of water, with constant trituration, and filter. Dissolve the remainder of the sugar in the clear filtrate, with the aid of a gentle heat, strain the syrup while hot, and add sufficient water to make the product measure *one thousand mils.*

Syrup of Ginger may also be made in the following manner:

Prepare a percolator in the manner described under *Syrupus.* Pour the filtrate obtained as directed in the preceding formula upon the remainder of the sugar, return the first portions of the percolate until it runs through clear, and, when all the liquid has passed, follow it with water, until all of the sugar is dissolved and the product measures *one thousand mils.* Mix thoroughly.

AVERAGE DOSE—Metric, 15 mils—Apothecaries, 4 fluidrachms.

TALCUM PURIFICATUM

Purified Talc

Talc. Purif.

A purified, native, hydrous magnesium silicate sometimes containing a small amount of aluminum silicate.

Purified Talc is a very fine, white or grayish-white powder, which adheres to the skin, is quite free from grittiness and is slippery to the touch; it is odorless and tasteless.

Mix 0.5 Gm. of Purified Talc with about 2 Gm. each of anhydrous sodium and potassium carbonates, heat the mixture in a platinum crucible until fusion is complete, and treat the resulting fused mass with hot distilled water. Then neutralize the liquid with diluted sulphuric acid, add 10 mils more of the diluted acid and evaporate the mixture until white fumes of sulphuric acid anhydride are evolved. Add 20 mils of distilled water, boil the mixture and filter; an insoluble residue of *silica* remains. The addition of ammonia water and ammonium chloride to the filtrate may produce a white gelatinous precipitate of *aluminum hydroxide*, and the filtrate from this mixture on the addition of sodium phosphate T.S. yields a white crystalline precipitate of magnesium ammonium phosphate.

Purified Talc, when subjected to ignition at red heat, loses not more than 5 per cent. of its weight.

Boil 10 Gm. of Purified Talc with 50 mils of distilled water for one-half hour, adding water from time to time to maintain approximately the original volume. It yields a filtrate which is neutral to litmus, and one-half of this filtrate, when evaporated and dried at 110° C., yields not more than 0.005 Gm. of residue (*soluble substances*). The remaining half of this filtrate, after slightly acidulating with hydrochloric acid, does not yield a blue color upon the addition of potassium ferrocyanide T.S. (*iron*).

NOTE—Purified Talc, when used as a filtering medium, should not be finer than a No. 100 powder.

TARAXACUM

Taraxacum

Tarax.—Dandelion

The dried rhizome and roots of *Taraxacum officinale* Weber (Fam. *Compositæ*). Preserve the thoroughly dried drug in tightly-closed containers, adding a few drops of chloroform or carbon tetrachloride, from time to time, to prevent attack by insects.

Cylindrical or somewhat flattened, gradually tapering, usually in broken pieces, from 6 to 15 cm. in length and from 5 to 15 mm. in thickness; externally brown or blackish-brown, longitudinally wrinkled, having numerous root and rootlet-scars; crown simple or branched with numerous leaf-bases showing annulate markings; odor slight or inodorous; taste bitter.

Under the microscope, transverse sections of the root of Taraxacum show a porous, pale yellow wood from 1 to 4 mm. in diameter, surrounded by a light brown bark from 2 to 6 mm. in thickness, the latter composed of concentric layers of laticiferous vessels and sieve tissues, alternating with whitish inulin-bearing parenchyma. The rhizome portions show a small pith.

The powder is light brown; when examined under the microscope it exhibits parenchyma cells which are large, thin-walled and contain irregular masses of inulin; fragments with yellowish-brown laticiferous vessels; tracheæ reticulate; intermediate fibers non-lignified, with irregular, simple and oblique pores.

Taraxacum yields not more than 10 per cent. of ash.

Preparations—Extractum Taraxaci Fluidextractum Taraxaci.

Average dose—Metric, 10 Gm.—Apothecaries, 2½ drachms.

TEREBENUM

Terebene

Tereben.

A liquid consisting of dipentene and other hydrocarbons, obtained by the action of concentrated sulphuric acid on oil of turpentine. Preserve it in well-closed containers, protected from light.

Terebene is a colorless, thin liquid, having a rather agreeable, thyme-like odor, and an aromatic, somewhat terebinthinate taste.

One mil of Terebene dissolves in 3 mils of alcohol at 25° C.; slightly soluble in water.

On exposure to light and air Terebene gradually becomes resinified, and acquires an acid reaction.

Specific gravity: 0.860 to 0.865 at 25° C.

It boils between 160° and 172° C.

Terebene does not redden blue litmus paper which has been moistened with alcohol. Its optical rotation does not exceed +0.3° in a 100 mm. tube at 25° C. (*unaltered oil of turpentine*).

After the determination of the boiling point, transfer the residue remaining in the distilling flask to a dish, by means of ether, and evaporate the liquid on a water bath; any residue remaining does not exceed 1 per cent. of the original weight of Terebene taken (*rosin*).

Average dose—Metric, 0.25 mil—Apothecaries, 4 minims.

TERPINI HYDRAS

Terpin Hydrate

Terpin. Hyd.

The hydrate [$C_{10}H_{18}(OH)_2+H_2O=190.18$] of the dihydric alcohol terpin. Preserve it in well-closed containers, in a cool place.

Terpin Hydrate occurs as colorless, lustrous, rhombic prisms, nearly odorless, and having a slightly aromatic and somewhat bitter taste. Efflorescent in dry air.

One Gm. of Terpin Hydrate dissolves in about 200 mils of water, 13 mils of alcohol, 135 mils of chloroform and in 140 mils of ether at 25° C.; also in about 34 mils of boiling water, 3 mils of boiling alcohol, and in about 1 mil of boiling glacial acetic acid.

Heated slowly to about 100° C. it sublimes in fine needles. When quickly heated, it melts between 115° C. and 117° C. with the loss of water. It also loses its water of crystallization slowly over sulphuric acid.

Add a few drops of sulphuric acid to a hot aqueous solution of Terpin Hydrate; the liquid becomes turbid and develops a strongly aromatic odor.

Incinerate about 2 Gm. of Terpin Hydrate; not more than 0.05 per cent. of ash remains.

Terpin Hydrate has no odor of turpentine, and its saturated, hot, aqueous solution is not acid to litmus.

AVERAGE DOSE—Metric, 0.25 Gm.—Apothecaries, 4 grains.

TERRA SILICEA PURIFICATA

Purified Siliceous Earth

Ter. Sil. Purif.—Purified Kieselguhr Purified Infusorial Earth

A form of silica ($SiO_2=60.30$) consisting of the frustules and fragments of diatoms, purified by boiling with diluted hydrochloric acid, washing and calcining. It does not contain more than 10 per cent. of moisture. Preserve it in tightly-closed containers.

Purified Siliceous Earth is a very bulky and very fine powder, white or of a pale light gray or pale buff color, without odor or taste. It readily absorbs moisture and will retain about four times its weight of water without the mixture becoming fluid.

It is insoluble in water, acids or dilute alkaline solutions.

Boil 10 Gm. of Purified Siliceous Earth with 50 mils of distilled water and filter the mixture; the filtrate is colorless and neutral to litmus.

When ignited its color is not darkened (organic impurities) nor does it lose more than 10 per cent. of its weight (*moisture*).

Add 1 Gm. of Purified Siliceous Earth to 25 mils of diluted hydrochloric acid; no effervescence occurs (*carbonate*) and, after boiling and filtering, the filtrate is colorless, and separate portions, when tested, yield no precipitate with barium chloride T.S. (*sulphate*) and no blue color with potassium ferrocyanide T.S. (*iron*).

Digest 1 Gm. of Purified Siliceous Earth, for fifteen minutes, with 20 mils of diluted hydrochloric acid and filter. Ten mils of the filtrate, when evaporated to dryness and ignited, does not leave a residue weighing more than 0.005 Gm.

THEOBROMINÆ SODIO-SALICYLAS

Theobromine Sodio-Salicylate

Theobrom. Sodio-Sal.

Sodium theobromine [$C_7H_7O_2N_4Na = 202.10$] and sodium salicylate, [$NaC_7H_5O_3 = 160.04$] in approximately molecular proportions. It yields, when dried to constant weight in a desiccator over sulphuric acid, not less than 46.5 per cent. of theobromine [$C_7H_8O_2N_4 = 180.10$]. Preserve it in well-closed containers.

Theobromine Sodio-Salicylate is a white, odorless powder, of a sweetish, saline, and somewhat alkaline taste. It gradually absorbs carbon dioxide from the air with the liberation of theobromine, becoming partially insoluble in water.

One Gm. of Theobromine Sodio-Salicylate dissolves in 1 mil of water at 25° C.; slightly soluble in alcohol.

An aqueous solution of Theobromine Sodio-Salicylate (1 in 20) is colorless and clear or at most opalescent, and is strongly alkaline to litmus and phenolphthalein T.S.

When ignited Theobromine Sodio-Salicylate yields a residue which colors a non-luminous flame intensely yellow and effervesces with acids.

An aqueous solution of Theobromine Sodio-Salicylate (1 in 100), slightly acidulated with acetic acid, becomes violet on the addition of ferric chloride T.S.

Dissolve 1 Gm. of Theobromine Sodio-Salicylate in 10 mils of distilled water in a separator, add a few mils of sodium hydroxide T.S. and shake the mixture with 10 mils of chloroform. The residue obtained after the evaporation of the separated chloroform layer, when dried to constant weight at 80° C., does not exceed 0.005 Gm. (*caffeine*).

About 0.1 Gm. of Theobromine Sodio-Salicylate dissolves in 2 mils of sulphuric acid without effervescing (*sodium carbonate*) and without producing more than a slight color (*organic impurities*).

Assay—Dissolve about 2 Gm. of Theobromine Sodio-Salicylate, previously dried to constant weight in a desiccator over sulphuric acid, and accurately weighed, in 10 mils of warm distilled water, and titrate the solution with normal hydrochloric acid V.S., phenolphthalein T.S. being used as indicator. Not more than 5.5 mils of normal hydrochloric acid V.S. is required to neutralize 2 Gm. of Theobromine Sodio-Salicylate. The solution should now be slightly alkaline to litmus or be made so by the addition of one or two drops of very dilute ammonia water. Allow it to stand at from 20° to 25° C. for three hours, stirring occasionally, then transfer the precipitate of theobromine obtained to a dried and weighed filter of 9 cm. diameter, and wash the precipitate and filter with four successive portions of 5 mils each of ice-cold distilled water, afterwards dry the filter and contents at 100° C. and weigh. To the weight of precipitate thus obtained add for each 2 Gm. of salt, 0.13 Gm. (the approximate quantity of theobromine remaining in the liquid and washings). The sum corresponds to not less than 46.5 per cent. of the weight of dried Theobromine Sodio-Salicylate taken.

About 0.05 Gm. of the precipitate obtained in the preceding assay, when evaporated to dryness on a water bath with 1 mil of hydrochloric acid and about 0.1 Gm. of potassium chlorate, leaves a reddish-yellow residue, which becomes purple on moistening with a drop of ammonia water. Another portion of about 0.2 Gm. of the precipitate, when slowly heated, volatilizes without melting and without leaving a weighable residue.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

THEOPHYLLINA

Theophylline

Theophyll.—Dimethylxanthine

An organic base [$C_7H_8O_2N_4+H_2O$ or 1:3 $C_5H_2(CH_3)_2.O_2N_4+H_2O=$ 198.12], isomeric with theobromine. It is found in small amounts in the leaves of *Thea sinensis* Linné (Fam. *Ternstrœmiaceæ*) and is also prepared synthetically.

Theophylline occurs as a white, crystalline powder; odorless and having a bitter taste. It is permanent in the air.

One Gm. of Theophylline dissolves in 100 mils of water and 80 mils of alcohol at 25° C. It is more readily soluble in hot water; sparingly soluble in ether. It is readily soluble in solutions of the alkali hydroxides and in ammonia water.

A saturated aqueous solution of Theophylline is neutral to litmus.

It melts between 269° and 272° C.

Dissolve about 0.01 Gm. of Theophylline in 1 mil of hydrochloric acid in a porcelain dish, add 0.1 Gm. of potassium chlorate, evaporate the solution to dryness on a water bath and invert the dish over a vessel containing a few drops of ammonia water; the residue acquires a purple color which is destroyed by fixed alkalies.

An aqueous solution of Theophylline yields a precipitate with tannic acid T.S. which is soluble in an excess of the reagent.

Dissolve about 0.5 Gm. of Theophylline in 5 mils of potassium hydroxide T.S. and add 15 mils of a solution containing 0.5 Gm. of sulphanilic acid and 5 mils of hydrochloric acid in 100 mils of distilled water and then add 5 mils of an aqueous solution of sodium nitrite (1 in 200). When this mixture is brought nearly to boiling and sodium hydroxide T.S. is added, drop by drop, a blood red color is produced (distinction from *caffeine or theobromine*).

A clear solution is produced when about 0.2 Gm. of Theophylline is dissolved in 5 mils of sodium hydroxide T.S. or in 5 mils of ammonia water (distinction from *caffeine, theobromine, or paraxanthine*).

Theophylline loses not more than 9.5 per cent. of its weight when dried to constant weight at 100° C.

Incinerate about 0.1 Gm. of Theophylline; no weighable ash remains.

About 0.2 Gm. of Theophylline dissolves in 5 mils of sulphuric acid without producing more than a faint yellow color (*organic impurities*).

AVERAGE DOSE—Metric, 0.25 Gm.—Apothecaries, 4 grains.

THYMOL

Thymol

A phenol [$C_{10}H_{14}O$ or $C_6H_3(CH_3)(OH)(C_3H_7)$ 1 : 3 : 4 = 150.11] occurring in the volatile oil of *Thymus vulgaris* Linné (Fam. *Labiatæ*) and in some other volatile oils. Preserve it in well-closed containers.

Thymol occurs in large, colorless, translucent, rhombic prisms, having an aromatic, thyme-like odor, and a pungent, aromatic taste, with a very slight caustic effect upon the lips.

One Gm. of Thymol dissolves in 1010 mils of water, about 1 mil of alcohol, 0.7 mil of chloroform, 1.5 mils of ether, and in 1.7 mils of olive oil at 25° C.; soluble in glacial acetic acid or in fixed or volatile oils.

Its alcoholic solution (1 in 20) is neutral to litmus and is optically inactive.

As a solid it is heavier than water, but when liquefied by fusion it is lighter than water.

It melts between 48° and 51° C., remaining liquid at a considerably lower temperature.

When it is triturated with about an equal weight of camphor or menthol, the mixture liquefies.

When a very small crystal of Thymol is dissolved in 1 mil of glacial acetic acid, and then 6 drops of sulphuric acid and 1 drop of nitric acid are added, the liquid assumes a deep bluish-green color by reflected light.

Heat about 1 Gm. of Thymol in a test tube in a water bath with 5 mils of a 10 per cent. solution of sodium hydroxide; a clear, colorless, or pale red solution is formed, which becomes darker on standing, without the separation of oily drops. Upon the addition of a few drops of chloroform to this solution and agitating the mixture, a violet color is produced.

Volatilize about 2 Gm. of Thymol on a water bath; not more than 0.05 per cent. of residue remains.

An alcoholic solution of Thymol (1 in 20) is not colored violet by ferric chloride T.S. (*phenol*).

	Metric	Apothecaries
AVERAGE DOSE—Antiseptic,	0.125 Gm.—	2 grains.
Anthelmintic,	1 Gm.—	15 grains, per day.

THYMOLIS IODIDUM

Thymol Iodide

Thymol. Iod.

Chiefly dithymol-diiodide [$C_{20}H_{24}O_2I_2$ or $(C_6H_2.CH_3.C_3H_7.OI)_2$ = 550.03]. It contains, when dried to constant weight in a desiccator over sulphuric acid, not less than 43 per cent. of iodine (I = 126.92). Preserve it in well-closed containers, protected from light.

Thymol Iodide is a reddish-brown or reddish-yellow bulky powder with a very slight, aromatic odor.

Thymol Iodide is insoluble in water or glycerin; slightly soluble in alcohol at 25° C.; readily soluble in chloroform, ether, collodion or in fixed or volatile oils, leaving a slight residue.

It is not soluble in solution of sodium hydroxide, either cold or warm. When heated with concentrated sulphuric acid, it is decomposed with the separation of iodine.

Dried to constant weight in a desiccator over sulphuric acid, it loses not more than 5 per cent. of its weight.

Incinerate about 0.5 Gm. of Thymol Iodide in a porcelain crucible at a temperature not exceeding a low red heat; not more than 1.5 per cent. of ash remains.

Shake about 0.1 Gm. of Thymol Iodide for one minute with 20 mils of distilled water and filter. The filtrate does not become more than opalescent on the addition of a few drops of nitric acid and silver nitrate T.S. (*halogen salts*).

Shake about 0.5 Gm. of Thymol Iodide with 10 mils of distilled water and filter the mixture; the filtrate is not alkaline to litmus (*alkalies*), nor is it colored blue upon the addition of a few drops of starch T.S. (*free iodine*).

Assay—Mix thoroughly about 0.25 Gm. of Thymol Iodide, previously dried to constant weight in a desiccator over sulphuric acid and accurately weighed, with about 3 Gm. of anhydrous sodium carbonate. Cover the mixture with about 1 Gm. more of anhydrous sodium carbonate and heat it moderately, in a crucible, gradually increasing the heat, but not exceeding a dull redness, until the mass is completely carbonized. When sufficiently cooled, extract the residue with boiling distilled water and wash it on a filter with boiling distilled water until the washings cease to produce an opalescence with silver nitrate T.S. Heat the combined washings, which measure about 150 mils, on a water bath and add an aqueous solution of potassium permanganate (1 in 20) in small portions, until the hot liquid remains permanently pink. Then add just enough alcohol to remove the pink tint, cool the liquid to room temperature, and dilute it to 200 mils. Mix it well and then filter through a dry filter, rejecting the first 50 mils of filtrate. To 100 mils of the subsequent clear filtrate add about 1 Gm. of potassium iodide (free from iodate) and an excess of diluted sulphuric acid, and titrate the liberated iodine with tenth-normal sodium thiosulphate V.S., adding starch T.S. near the end of the titration. It shows, in the dried Thymol Iodide, not less than 43 per cent. of I.

Each mil of the tenth-normal sodium thiosulphate V.S. used corresponds to 0.002115 Gm. of I. Each gramme of Thymol Iodide corresponds to not less than 203.3 mils of tenth-normal sodium thiosulphate V.S.

THYROIDEUM SICCUM

Dried Thyroids

Thyroid. Sicc.—Glandulæ Thyroideæ Siccæ, U.S.P. VIII
Desiccated Thyroid Glands

The thyroid glands of animals which are used for food by man, freed from connective tissue and fat, dried and powdered, and containing not less than 0.17 per cent. nor more than 0.23 per cent. of iodine (I = 126.92) in thyroid combination. One part of Dried Thyroids corresponds to approximately 5 parts of the fresh glands.

A yellowish, amorphous powder, having a slight, characteristic odor.

Dried Thyroids must be free from iodine in inorganic or any other form of combination than that peculiar to the thyroid.

Dried Thyroids contain not more than 6 per cent. of moisture and the yield of ash does not exceed 5 per cent.

Assay—Mix 1 Gm. of Dried Thyroids in a nickel crucible of about 125 mils capacity, with 15 Gm. of a mixture composed of 138 parts by weight of anhydrous potassium carbonate, 106 parts of anhydrous sodium carbonate and 75 parts of potassium nitrate. Spread an additional 5 Gm. of this fusion mixture evenly over the surface. Heat the crucible over a free Bunsen flame until no further carbonization is observed, cool it and dissolve the residue in about 150 mils of distilled water, warming to hasten solution. Transfer this solution to an Erlenmeyer flask of about 500 mils capacity and add approximately 50 mils, or its equivalent, of a fresh solution of chlorinated soda (containing 2.4 per cent. of chlorine by weight). Now treat the mixture with enough phosphoric acid, diluted with an equal volume of distilled water, to produce an appreciable yellow tint of free chlorine, then add 10 mils more of the phosphoric acid diluted with an equal volume of distilled water, and boil the contents of the flask for one-half hour or until the volume has been reduced to about 150 mils. Cool the liquid, add 10 mils of an aqueous solution of potassium iodide (1 in 100) and titrate the liberated iodine with freshly prepared two-hundredth-normal sodium thiosulphate V.S., starch T.S. being used as indicator just before the end of the reaction. It shows not less than 0.17 per cent. nor more than 0.23 per cent. of I.

Each mil of two-hundredth-normal sodium thiosulphate V.S. used corresponds to 0.1058 milligrammes of I derived from the Thyroid Glands used. Each gramme of Dried Thyroids corresponds to not less than 16.07 mils nor more than 21.74 mils of two-hundredth-normal sodium thiosulphate V.S.

AVERAGE DOSE—Metric, 0.1 Gm.—Apothecaries, 1½ grains.

TINCTURÆ

Tinctures

Tinctures are alcoholic preparations made by extracting the valuable principles from drugs by the use of appropriate menstrua or solvents. Tincture of ferric chloride and tincture of iodine are exceptional, not being made by extraction; they are alcoholic solutions of chemical substances.

Tinctures of potent drugs are made of the strength of *ten grammes* of drug in *one hundred mils* of tincture. The other tinctures vary in the proportion of drug in the finished tincture.

Tinctures are made by percolation with few exceptions. Maceration or solution is preferred when from its physical character the drug is not suitable for percolation.

The majority of official tinctures are prepared under one or the other of the two type processes described, and in each formula directions are given as to the process to be followed with such modification as may be necessary. A number of drugs require special manipulation for the preparation of satisfactory tinctures, and for these the formulas in full will be found in the text.

Where it has been found possible and desirable to standardize the tinctures a rubric and assay have been added.

Tinctures should be stored in tightly-stoppered bottles, kept in a cool place, and protected from light.

Type Process P—Percolation

Moisten the powdered drug or mixed drugs designated in the formula with a sufficient quantity of the prescribed menstruum to render it evenly and distinctly damp, transfer it to a percolator, and, without pressing the powder, allow it to stand well-covered for six hours; then pack it firmly, unless otherwise directed, and pour on enough of the menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for twenty-four hours. Then allow the percolation to proceed slowly, gradually adding sufficient of the menstruum to make *one thousand mils* of finished tincture.

Modification for Assayed Tinctures—In Tinctures that are directed to be assayed, allow the percolation to proceed until the percolate measures *nine hundred and fifty mils*. Assay a sample of this percolate as directed and from the alkaloidal content thus determined, ascertain by calculation the amount of alkaloids in the remainder of the liquid and add to this enough of the menstruum to make the finished Tincture conform to the required alkaloidal standard.

Type Process M—Maceration

Macerate the drug or mixed drugs designated in the formula in a stoppered container, in a moderately warm place, with *seven hundred and fifty mils* of the prescribed solvent (unless a different amount is specified in the formula). Continue the maceration with frequent agitation during three days or until the drug is practically extracted, transfer the mixture to a filter and, when the liquid has drained off completely, gradually wash the residue on the filter with enough of the solvent to make *one thousand mils* of finished tincture.

TINCTURA ACONITI

Tincture of Aconite

Tr. Aconit.—Aconiti tinctura P.I.

One hundred mils of Tincture of Aconite yields not less than 0.045 Gm. nor more than 0.055 Gm. of the ether-soluble alkaloids of aconite. If assayed biologically the minimum lethal dose should not be greater than 0.0004 mil for each gramme of body weight of guinea-pig.

Aconite, in No. 60 powder, *one hundred grammes*	100 Gm.
To make about *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process P, as modified for assayed tinctures (see page 444), using a mixture of *seven volumes* of alcohol and *three volumes* of water as the menstruum and adjusting the volume of the finished Tincture so that each *one hundred mils* contains 0.05 Gm. of the ether-soluble alkaloids of aconite.

Assay—Evaporate 150 mils of Tincture of Aconite at a temperature not exceeding 75° C., until it measures about 20 mils. Add 10 Gm. of purified sawdust (see Reagents, Part II) to this liquid, incorporate it thoroughly and then continue the evaporation until the sawdust is dry. Transfer the impregnated sawdust to a 250 mil flask, add 150 mils of ether and proceed as directed in the assay under *Belladonnæ Radix*, page 73, third line of the Assay, modifying the process there given by using the ammonia water with a small quantity of distilled water to rinse out the dish in which the mixture was evaporated, and use ether only in the final extraction of the alkaloids.

Each mil of tenth-normal sulphuric acid V.S. consumed corresponds to 64.539 milligrammes of the ether-soluble alkaloids of aconite.

For an alternative method of assaying Tincture of Aconite, see Biological Assays (Part II).

Average dose—Metric, 0.3 mil—Apothecaries, 5 minims.

TINCTURA ALOES

Tincture of Aloes

Tr. Aloes

Aloes, in No. 40 powder, *one hundred grammes*	100 Gm.
Glycyrrhiza, in No. 40 powder, *two hundred grammes* ...	200 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process M (see page 445), using diluted alcohol as the solvent.

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

TINCTURA ARNICÆ

Tincture of Arnica

Tr. Arnic.

Arnica, in No. 20 powder, *two hundred grammes*	200 Gm.
Diluted Alcohol, *a sufficient quantity*,	
To make *one thousand milliliters*	1000 mils

Moisten the drug with *five hundred mils* of diluted alcohol, transfer it to a percolator, and, without pressing the powder, allow it to stand well covered for twenty-four hours, then pack it with moderate pressure and allow the percolation to proceed slowly, pouring on additional diluted alcohol as needed. When the percolate measures *two hundred and fifty mils*, stop the flow, macerate the drug for an additional twenty-four hours, and then continue the percolation until the total percolate measures *five hundred mils*. Again interrupt the percolation, macerate the drug for another twelve hours and afterwards collect an additional *two hundred and fifty mils* of percolate. Again macerate the drug for twelve hours and then allow the percolation to proceed slowly, pouring on sufficient diluted alcohol to make *one thousand mils* of Tincture.

Average dose—Metric, 1 mil—Apothecaries, 15 minims.

TINCTURA ASAFŒTIDÆ

Tincture of Asafetida

Tr. Asafœt.

ASAFETIDA, bruised, *two hundred grammes*	200 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process M (see page 445), using alcohol as the solvent.

AVERAGE DOSE—Metric, 1 mil—Apothecaries, 15 minims.

TINCTURA AURANTII AMARI

Tincture of Bitter Orange Peel

Tr. Aurant. Amar.

BITTER ORANGE PEEL, in No. 40 powder, *two hundred grammes*	200 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process P (see page 444), using a mixture of *three volumes* of alcohol and *two volumes* of water as the menstruum.

AVERAGE DOSE—Metric, 4 mils—Apothecaries, 1 fluidrachm.

TINCTURA AURANTII DULCIS

Tincture of Sweet Orange Peel

Tr. Aurant. Dulc.

SWEET ORANGE PEEL, grated from the fresh fruit, *five hundred grammes*	500 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process M (see page 445), macerating the drug in *one thousand mils* of alcohol and completing the preparation with alcohol. Use purified cotton as the filtering medium.

Preparation—Syrupus Aurantii.

AVERAGE DOSE—Metric, 4 mils—Apothecaries, 1 fluidrachm.

TINCTURA BELLADONNÆ FOLIORUM

Tincture of Belladonna Leaves

Tr. Bellad. Fol.—Belladonnæ tinctura P.I.

One hundred mils of Tincture of Belladonna Leaves yields not less than 0.027 Gm. nor more than 0.033 Gm. of the total alkaloids of belladonna leaves.

Belladonna Leaves, in No. 60 powder, *one hundred grammes*	100 Gm.
To make about *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process P, as modified for assayed tinctures (see page 444), using diluted alcohol as the menstruum and adjusting the volume of the finished Tincture so that each *one hundred mils* contains 0.03 Gm. of the total alkaloids of belladonna leaves.

Assay—Evaporate 100 mils of Tincture of Belladonna Leaves on a water bath until it measures about 10 mils, transfer the evaporated liquid to a separator, and proceed as directed in the assay under *Fluidextractum Belladonnæ Radicis*, page 178, second line of the Assay, beginning with the words "add 10 mils," modifying the process there given by increasing the ammonia water to 5 mils which, with about 5 mils of distilled water, is to be used in divided portions to rinse out the dish in which the mixture was evaporated; before titrating treat the residue twice with 5 mils of ether, evaporating to dryness each time.

Average dose—Metric, 0.75 mil—Apothecaries, 12 minims.

TINCTURA BENZOINI

Tincture of Benzoin

Tr. Benz.

Benzoin, in No. 40 powder, *two hundred grammes*	200 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process M (see page 445), using alcohol as the solvent.

Average dose—Metric, 1 mil—Apothecaries, 15 minims.

TINCTURA BENZOINI COMPOSITA

Compound Tincture of Benzoin

Tr. Benz. Co.

Benzoin, in No. 40 powder, *one hundred grammes*	100 Gm.
Aloes, in No. 40 powder, *twenty grammes*	20 Gm.

Storax, *eighty grammes*	80 Gm.
Balsam of Tolu, *forty grammes*	40 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process M (see page 445), using alcohol as the solvent.

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

TINCTURA CALUMBÆ

Tincture of Calumba

Tr. Calumb.

Calumba, in No. 20 powder, *two hundred grammes*	200 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process P (see page 444), packing the moistened drug moderately, and using a mixture of *three volumes* of alcohol and *two volumes* of water as the menstruum.

Average dose—Metric, 4 mils—Apothecaries, 1 fluidrachm.

TINCTURA CANNABIS

Tincture of Cannabis

Tr. Cannab.—Tinctura Cannabis Indicæ, U.S.P. VIII

When assayed biologically Tincture of Cannabis produces incoördination when administered to dogs in a dose of not more than 0.3 mil per kilogramme of body weight.

Cannabis, in No. 40 powder, *one hundred grammes*	100 Gm.
To make about *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process P, as modified for assayed tinctures (see page 444), using alcohol as the menstruum, and adjusting the volume of the finished Tincture to conform with the above biological standard.

Assay—Proceed as directed under Biological Assays (Part II).

Average dose—Metric, 0.75 mil—Apothecaries, 12 minims.

TINCTURA CANTHARIDIS

Tincture of Cantharides

Tr. Canthar.—Cantharidis tinctura P. I.

Cantharides, in No. 60 powder, *one hundred grammes*	100 Gm.
Alcohol, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Place the cantharides in a strong tin container, which has a capacity of not less than *two thousand mils.* Add the alcohol, agitate the mixture thoroughly, and insert in the opening of the can a tightly fitting cork through which passes a glass tube, not less than 6.4 mm. in diameter and 75 cm. in length. Place the can in a water bath and maintain a temperature of from 50° to 55° C. for twenty-four hours with frequent agitation. Then remove it from the water bath, pour the contents into a cylindrical percolator, in the neck of which has been placed a pledget of purified cotton, allow the percolation to proceed, and, after the liquid has disappeared from the surface and ceased to drop from the percolator, gradually pour on sufficient alcohol to make *one thousand mils* of Tincture.

Average dose—Metric, 0.1 mil—Apothecaries, 1½ minims.

TINCTURA CAPSICI

Tincture of Capsicum

Tr. Capsic.

Capsicum, in No. 50 powder, *one hundred grammes*	100 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process P (see page 444), using a mixture of *ninety-five volumes* of alcohol and *five volumes* of water as the menstruum.

Average dose—Metric, 0.5 mil—Apothecaries, 8 minims.

TINCTURA CARDAMOMI

Tincture of Cardamom

Tr. Cardam.

Cardamom Seed, in No. 40 powder, *one hundred and fifty grammes*	150 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process P (see page 444), using diluted alcohol as the menstruum.

AVERAGE DOSE—Metric, 2 mils—Apothecaries, 30 minims.

TINCTURA CARDAMOMI COMPOSITA

Compound Tincture of Cardamom

Tr. Cardam. Co.

CARDAMOM SEED, in No. 40 powder, *twenty grammes*....	20 Gm.
SAIGON CINNAMON, in No. 60 powder, *twenty-five grammes*	25 Gm.
CARAWAY, in No. 40 powder, *twelve grammes*...........	12 Gm.
COCHINEAL, in No. 60 powder, *five grammes*............	5 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process M (see page 445), macerating the mixed powders in *seven hundred and fifty mils* of a mixture of *fifty mils* of glycerin and *nine hundred and fifty mils* of diluted alcohol and completing the preparation by using first the remainder of the mixture prepared as directed above and then diluted alcohol.

AVERAGE DOSE—Metric, 4 mils—Apothecaries, 1 fluidrachm.

TINCTURA CINCHONÆ

Tincture of Cinchona

Tr. Cinch.

One hundred mils of Tincture of Cinchona yields not less than 0.8 Gm. nor more than 1 Gm. of the alkaloids of cinchona.

CINCHONA, in No. 40 powder, *two hundred grammes*.....	200 Gm.
To make about *one thousand milliliters*.....	1000 mils

Prepare a Tincture by Type Process P, as modified for assayed tinctures (see page 444), using as the first menstruum a mixture of *seventy-five mils* of glycerin, *six hundred and seventy-five mils* of alcohol and *two hundred and fifty mils* of water and completing the percolation with a mixture of *two volumes* of alcohol and *one volume* of water. Then adjust the volume of the finished Tincture so that each *one hundred mils* contains 0.9 Gm. of the alkaloids of cinchona.

Assay—Evaporate 25 mils of Tincture of Cinchona on a water bath until it measures about 15 mils, add 10 Gm. of purified sawdust (see Reagents, Part II), incorporate this thoroughly and then continue the evaporation at a temperature not exceeding 80° C. until it is dry. Transfer the impregnated sawdust to a 500 mil flask, and proceed as directed in the assay under *Cinchona*, page 112, third line of the Assay, modifying the process there given by increasing the ammonia water to 10 mils and using this in divided portions to rinse the dish in which the mixture was evaporated; then add the rinsings to the flask.

AVERAGE DOSE—Metric, 4 mils—Apothecaries, 1 fluidrachm.

TINCTURA CINCHONÆ COMPOSITA

Compound Tincture of Cinchona

Tr. Cinch. Co.

One hundred mils of Compound Tincture of Cinchona yields not less than 0.4 Gm. nor more than 0.5 Gm. of the alkaloids of cinchona.

RED CINCHONA, in No. 40 powder, *one hundred grammes.*	100 Gm.
BITTER ORANGE PEEL, in No. 40 powder, *eighty grammes*	80 Gm.
SERPENTARIA, in No. 60 powder, *twenty grammes*........	20 Gm.
To make about *one thousand milliliters*.....	1000 mils

Prepare a Tincture by Type Process P, as modified for assayed tinctures (see page 444), using as the first menstruum a mixture of *seventy-five mils* of glycerin, *six hundred and seventy-five mils* of alcohol and *two hundred and fifty mils* of water and completing the percolation with a mixture of *two volumes* of alcohol and *one volume* of water. Then adjust the volume of the finished Tincture so that each *one hundred mils* contains 0.45 Gm. of the alkaloids of cinchona.

Assay—Proceed as directed in the assay under *Tinctura Cinchonæ*, page 451, modifying the process there given by using 50 mils of the Compound Tincture instead of 25 mils of the tincture there directed.

AVERAGE DOSE—Metric, 4 mils—Apothecaries, 1 fluidrachm.

TINCTURA CINNAMOMI

Tincture of Cinnamon

Tr. Cinnam.

SAIGON CINNAMON, in No. 50 powder, *two hundred grammes*..	200 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process P (see page 444), using a mixture of *seventy-five volumes* of glycerin, *six hundred and seventy-five volumes* of alcohol, and *two hundred and fifty volumes* of water as the menstruum.

AVERAGE DOSE—Metric, 2 mils—Apothecaries, 30 minims.

TINCTURA COLCHICI SEMINIS

Tincture of Colchicum Seed

Tr. Colch. Sem.—Colchici tinctura P. I.

One hundred mils of Tincture of Colchicum Seed yields not less than 0.036 Gm. nor more than 0.044 Gm. of colchicine.

Colchicum Seed, in No. 50 powder, *one hundred grammes*	100 Gm.
To make about *one thousand milliliters*.....	1000 mils

Prepare a Tincture by Type Process P, as modified for assayed tinctures (see page 444), using a mixture of *three volumes* of alcohol and *two volumes* of water as the menstruum and adjusting the volume of the finished Tincture so that each *one hundred mils* contains 0.04 Gm. of colchicine.

Assay—Evaporate 150 mils of Tincture of Colchicum Seed on a water bath to about 20 mils, transfer it to a 50 mil graduated flask and rinse the evaporating dish with about 10 mils of distilled water, in divided portions. Then add 10 mils of solution of lead subacetate, shake the mixture thoroughly, add enough distilled water to make 50 mils and pour this into a 500 mil flask. Now add 250 mils of recently boiled distilled water, using part of the water to rinse the 50 mil flask, and proceed as directed in the assay under *Colchici Semen,* page 120, fifth line of the Assay, beginning with the words "filter off 200 mils."

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

TINCTURA DIGITALIS

Tincture of Digitalis

Tr. Digit.—Digitalis tinctura P. I.

If assayed biologically the minimum lethal dose should not be greater than 0.006 mil of the Tincture, or the equivalent in Tincture of 0.0000005 Gm. of ouabain, for each gramme of body weight of frog.

Digitalis, in No. 60 powder, *one hundred grammes*......	100 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process P (see page 444), using a mixture of *three volumes* of alcohol and *one volume* of water as the menstruum.

Assay—For a method of assaying Tincture of Digitalis see Biological Assays (Part II).

Average dose—Metric, 0.5 mil—Apothecaries, 8 minims.

TINCTURA FERRI CHLORIDI

Tincture of Ferric Chloride

Tr. Ferr. Chlor.

A hydro-alcoholic solution containing ferric chloride [$FeCl_3 = 162.22$] (about 13 per cent.), corresponding to not less than 4.48 per cent. of Fe. Protect Tincture of Ferric Chloride from light.

SOLUTION OF FERRIC CHLORIDE, *three hundred and fifty milliliters*	350 mils
ALCOHOL, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Mix the solution with enough alcohol to make *one thousand mils,* then transfer the Tincture to an amber-colored, glass-stoppered bottle and keep it for at least three months before dispensing.

A bright, amber-colored liquid, having a slightly ethereal odor, a very astringent, styptic taste, and an acid reaction.

Specific gravity: about 1.00 at 25° C.

The Tincture yields a brownish red precipitate with ammonia water, a blue precipitate with potassium ferrocyanide T.S., and a white precipitate, insoluble in nitric acid, with silver nitrate T.S.

After the Tincture has been exposed for some time to daylight, it yields a greenish or greenish-blue color with potassium ferricyanide T.S. (presence of some *ferrous salt,* due to reduction).

Add a clear crystal of ferrous sulphate to a cooled mixture of equal volumes of concentrated sulphuric acid and a diluted portion of the Tincture (1 in 10); the crystal does not become brown, nor is a brownish-black zone developed around it (*nitric acid*).

Assay—Evaporate to dryness in a porcelain dish on a water bath about 5 mils of Tincture of Ferric Chloride, accurately weighed in a tared weighing-bottle. Add 2 mils of hydrochloric acid and 5 mils of solution of hydrogen dioxide to the residue and again evaporate the mixture to dryness. Dissolve this residue in 25 mils of distilled water, transfer the solution to a 250 mil glass-stoppered flask, mix it with 3 mils of hydrochloric acid and about 1 Gm. of potassium iodide, and allow the mixture to stand for thirty minutes at a temperature of 40° C. Cool the solution, add 100 mils of distilled water and titrate the liberated iodine with tenth-normal sodium thiosulphate V.S. It shows not less than 4.48 per cent. of Fe.

Each mil of tenth-normal sodium thiosulphate V.S. used corresponds to 0.005584 Gm. of Fe. Each gramme of Tincture of Ferric Chloride corresponds to not less than 8 mils of tenth-normal sodium thiosulphate V.S.

Preparation—Liquor Ferri et Ammonii Acetatis.

AVERAGE DOSE—Metric, 0.5 mil—Apothecaries, 8 minims.

TINCTURA GAMBIR COMPOSITA

Compound Tincture of Gambir

Tr. Gambir Co.—Compound Tincture of Pale Catechu

GAMBIR, in No. 50 powder, *fifty grammes*	50 Gm.
SAIGON CINNAMON, in No. 50 powder, *twenty-five grammes*	25 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process M (see page 445), using diluted alcohol as the solvent.

AVERAGE DOSE—Metric, 4 mils—Apothecaries, 1 fluidrachm.

TINCTURA GELSEMII

Tincture of Gelsemium

Tr. Gelsem.

GELSEMIUM, in No. 60 powder, *one hundred grammes*	100 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process P (see page 444), using a mixture of *sixty-five volumes* of alcohol and *thirty-five volumes* of water as the menstruum.

AVERAGE DOSE—Metric, 0.25 mil—Apothecaries, 4 minims.

TINCTURA GENTIANÆ COMPOSITA

Compound Tincture of Gentian

Tr. Gentian. Co.

GENTIAN, in No. 40 powder, *one hundred grammes*	100 Gm.
BITTER ORANGE PEEL, in No. 40 powder, *forty grammes*.	40 Gm.
CARDAMOM SEED, in No. 40 powder, *ten grammes*	10 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process P (see page 444), packing it moderately and using as the first menstruum a mixture of *one hundred mils* of glycerin, *five hundred mils* of alcohol and *four hundred mils* of water and completing the percolation with diluted alcohol.

AVERAGE DOSE—Metric, 4 mils—Apothecaries, 1 fluidrachm.

TINCTURA GUAIACI

Tincture of Guaiac

Tr. Guaiac.

GUAIAC, in No. 40 powder, *two hundred grammes*	200 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process M (see page 445), using alcohol as the solvent.

AVERAGE DOSE—Metric, 4 mils—Apothecaries, 1 fluidrachm.

TINCTURA GUAIACI AMMONIATA

Ammoniated Tincture of Guaiac

Tr. Guaiac. Ammon.

GUAIAC, in No. 40 powder, *two hundred grammes*	200 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process M (see page 445), using aromatic spirit of ammonia as the solvent.

AVERAGE DOSE—Metric, 2 mils—Apothecaries, 30 minims.

TINCTURA HYDRASTIS

Tincture of Hydrastis

Tr. Hydrast.—Tincture of Golden Seal

One hundred mils of Tincture of Hydrastis yields not less than 0.36 Gm. nor more than 0.44 Gm. of the ether-soluble alkaloids of hydrastis.

HYDRASTIS, in No. 60 powder, *two hundred grammes*	200 Gm.
To make about *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process P, as modified for assayed tinctures (see page 444), using a mixture of *two volumes* of alcohol and *one volume* of water as the menstruum and adjusting the volume of the finished Tincture so that each *one hundred mils* contains 0.4 Gm. of the ether-soluble alkaloids of hydrastis.

Assay—Evaporate 50 mils of Tincture of Hydrastis on a water bath until it measures about 10 mils, transfer the evaporated liquid to a separator, and proceed as directed in the assay under *Fluidextractum Belladonnæ Radicis*, page 178, second line of the Assay, beginning with the words "add 10 mils," modifying the process there given by using the ammonia water with about

5 mils of distilled water, in divided portions, to rinse out the dish in which the Tincture was evaporated. Use only ether as the immiscible solvent throughout the assay and dry the residue at 100° C. to constant weight, instead of titrating it. The weight of the residue represents the amount of ether-soluble alkaloids in 50 mils of Tincture of Hydrastis.

Average dose—Metric, 4 mils—Apothecaries, 1 fluidrachm.

TINCTURA HYOSCYAMI

Tincture of Hyoscyamus

Tr. Hyosc. —Tincture of Henbane Hyoscyami tinctura P. I.

One hundred mils of Tincture of Hyoscyamus yields not less than 0.0055 Gm. nor more than 0.0075 Gm. of the alkaloids of hyoscyamus.

Hyoscyamus, in No. 60 powder, *one hundred grammes*...	100 Gm.
To make about *one thousand milliliters*.....	1000 mils

Prepare a Tincture by Type Process P, as modified for assayed tinctures (see page 414), using diluted alcohol as the menstruum and adjusting the volume of the finished Tincture so that each *one hundred mils* contains 0.0065 Gm. of the alkaloids of hyoscyamus.

Assay—Evaporate 250 mils of Tincture of Hyoscyamus on a water bath to about 10 mils, transfer the evaporated liquid to a separator, and proceed as directed in the assay under *Fluidextractum Belladonnæ Radicis*, page 178, second line of the Assay, beginning with the words "add 10 mils," modifying the process there given by increasing the ammonia water to 5 mils which, with 5 mils of distilled water, is to be used, in divided portions, to rinse the dish in which the Tincture was evaporated; before titrating treat the residue twice with 5 mils of ether, evaporating to dryness each time.

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

TINCTURA IODI

Tincture of Iodine

Tr. Iodi

An alcoholic solution of iodine and potassium iodide. *One hundred mils* contains not less than 6.5 Gm. nor more than 7.5 Gm. of I (126.92) and not less than 4.5 Gm. nor more than 5.5 Gm. of KI (166.02).

Iodine, *seventy grammes*..............................	70 Gm.
Potassium Iodide, *fifty grammes*....................	50 Gm.
Distilled Water, *fifty milliliters*.....................	50 mils
Alcohol, *a sufficient quantity*,	
To make *one thousand milliliters*..........	1000 mils

Dissolve the potassium iodide in the distilled water contained in a bottle graduated to *one thousand mils*; add the iodine and agitate the mixture until solution is effected. Then add sufficient alcohol to make *one thousand mils* of Tincture, and mix thoroughly.

Assay for Potassium Iodide—Evaporate 10 mils of Tincture of Iodine in a tared porcelain dish on a water bath and gently heat the residue over a Bunsen flame to volatilize the iodine; it leaves a residue weighing not less then 0.45 Gm. nor more than 0.55 Gm., which corresponds to the identity tests under *Potassii Iodidum.*

Assay for Iodine—Mix 5 mils of the Tincture with 25 mils of distilled water and titrate the solution with tenth-normal sodium thiosulphate V.S.; it requires not less than 25.6 mils nor more than 29.6 mils of tenth-normal sodium thiosulphate V.S. for complete decoloration.

Each mil of tenth-normal sodium thiosulphate V.S. corresponds to 0.012692 Gm. of I.

AVERAGE DOSE—Metric, 0.1 mil—Apothecaries 1½ minims.

TINCTURA KINO

Tincture of Kino

Tr. Kino

KINO, *one hundred grammes*	100 Gm.
To make *one thousand milliliters*	1000 mils

Place the kino in a capacious flask and pour on it *five hundred mils* of boiling water. Agitate the mixture thoroughly, then heat it on a water bath, containing boiling water, for one hour, shaking it frequently. Allow the liquid to cool, add enough recently boiled water to make the product measure *five hundred mils* and then add *five hundred mils* of alcohol. Stopper the flask, set it aside in a cool place for twenty-four hours and then decant the mixture through cheese cloth. Preserve it in a cool and dark place, in small bottles, tightly corked.

AVERAGE DOSE—Metric, 4 mils—Apothecaries, 1 fluidrachm.

TINCTURA LACTUCARII

Tincture of Lactucarium

Tr. Lactucar.

LACTUCARIUM, *five hundred grammes*	500 Gm.
GLYCERIN, *two hundred and fifty milliliters*	250 mils
ALCOHOL,	
PURIFIED PETROLEUM BENZIN,	
DILUTED ALCOHOL,	
WATER, each, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Beat the lactucarium with clear sand, in an iron mortar, to a coarse powder, and then transfer it to a bottle; add *two thousand mils* of purified petroleum benzin, cork the bottle tightly, and set it aside for forty-eight hours, frequently agitating the mixture. Pour the mixture on a double filter, cover the funnel, and, when the liquid has passed through the filter, wash the residue gradually with *fifteen hundred mils* of purified petroleum benzin, and then allow the lactucarium to dry by exposing it to a current of air. When it is dry and free from the odor of benzin, reduce it to a powder, using more sand, if necessary, and pack it moderately in a conical percolator. Mix the glycerin with *two hundred and fifty mils* of water and *five hundred mils* of alcohol, and gradually pour this mixture on the powder. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for twenty-four hours. Then allow the percolation to proceed slowly, gradually adding first the remainder of the menstruum and then diluted alcohol, until the drug is exhausted. Reserve the first *seven hundred and fifty mils* of the percolate, evaporate the remainder on a water bath at a temperature not exceeding 70° C. until it measures *two hundred and fifty mils*, and mix this with the reserved portion. Filter the mixed liquids and wash the filter with sufficient diluted alcohol to make *one thousand mils* of Tincture.

Preparation—Syrupus Lactucarii.

AVERAGE DOSE—Metric, 2 mils—Apothecaries, 30 minims.

TINCTURA LAVANDULÆ COMPOSITA

Compound Tincture of Lavender

Tr. Lavand. Co.—Compound Spirit of Lavender

OIL OF LAVENDER, *eight milliliters*	8 mils
OIL OF ROSEMARY, *two milliliters*	2 mils
SAIGON CINNAMON, in No. 50 powder, *twenty grammes*	20 Gm.
CLOVE, in No. 50 powder, *five grammes*	5 Gm.
MYRISTICA, in No. 50 powder, *ten grammes*	10 Gm.
RED SAUNDERS, in No. 50 powder, *ten grammes*	10 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process M (see page 445), macerating the powders in a mixture of *seven hundred and fifty mils* of alcohol, in which the oils have been dissolved, and *two hundred and fifty mils* of water. Complete the preparation with a mixture of *three volumes* of alcohol and *one volume* of water.

AVERAGE DOSE—Metric, 2 mils—Apothecaries, 30 minims.

TINCTURA LIMONIS CORTICIS

Tincture of Lemon Peel

Tr. Limon. Cort.

LEMON PEEL, grated from the fresh fruit, *five hundred grammes*	500 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process M (see page 445), macerating the drug in *one thousand mils* of alcohol and completing the preparation with alcohol. Use purified cotton as the filtering medium.

TINCTURA LOBELIÆ

Tincture of Lobelia

Tr. Lobel.—Lobeliæ tinctura P.I.

LOBELIA, in No. 50 powder, *one hundred grammes*	100 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process P (see page 444), using diluted alcohol as the menstruum.

AVERAGE DOSE—Metric, 1 mil—Apothecaries, 15 minims.

TINCTURA MOSCHI

Tincture of Musk

Tr. Mosch.

MUSK, *five grammes*	5 Gm.
ALCOHOL, *forty-five milliliters*	45 mils
WATER, *forty-five milliliters*	45 mils
DILUTED ALCOHOL, *a sufficient quantity,*	
To make *one hundred milliliters*	100 mils

Triturate the musk with the water gradually added until a smooth mixture is obtained; transfer this to a bottle and allow the mixture to macerate for twenty-four hours; then add the alcohol and macerate the mixture for six days, with occasional agitation. Transfer this mixture to a plain paper filter, and, when the liquid has drained off completely, wash the residue on the filter with sufficient diluted alcohol to make *one hundred mils* of Tincture.

AVERAGE DOSE—Metric, 4 mils—Apothecaries, 1 fluidrachm.

TINCTURA MYRRHÆ

Tincture of Myrrh

Tr. Myrrh.

MYRRH, in moderately coarse powder, *two hundred grammes*	200 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process M (see page 445), using alcohol as the solvent.

AVERAGE DOSE—Metric, 1 mil—Apothecaries, 15 minims.

TINCTURA NUCIS VOMICÆ

Tincture of Nux Vomica

Tr. Nuc. Vom.—Strychni tinctura P.I.

One hundred mils of Tincture of Nux Vomica yields not less than 0.237 Gm. nor more than 0.263 Gm. of the alkaloids of nux vomica.

NUX VOMICA, in No. 40 powder, *one hundred grammes*. . .	100 Gm.
To make about *one thousand milliliters*.	1000 mils

Prepare a Tincture by Type Process P, as modified for assayed tinctures (see page 444), using a mixture of *three volumes* of alcohol and *one volume* of water as the menstruum and adjusting the volume of the finished Tincture so that each *one hundred mils* contains 0.25 Gm. of the alkaloids of nux vomica. The rate of flow for the percolate should not exceed ten drops per minute.

Assay—Evaporate 100 mils of Tincture of Nux Vomica on a water bath until it measures about 10 mils, transfer the evaporated liquid to a separator, and proceed as directed in the assay under *Fluidextractum Belladonnæ Radicis*, page 178, second line of the Assay, beginning with the words "add 10 mils," modifying the process there given by using 5 mils of ammonia water with a little distilled water, in divided portions, to rinse the dish in which the Tincture was evaporated and by dissolving the residue in 10 mils of tenth-normal sulphuric acid V.S. instead of 5 mils.

Each mil of tenth-normal sulphuric acid V.S. consumed corresponds to 36.4 milligrammes of the alkaloids of nux vomica.

AVERAGE DOSE—Metric, 0.5 mil—Apothecaries, 8 minims.

TINCTURA OPII

Tincture of Opium

Tr. Opii—Laudanum Opii tinctura P.I.

One hundred mils of Tincture of Opium yields not less than 0.95 Gm. nor more than 1.05 Gm. of anhydrous morphine.

Granulated Opium, *one hundred grammes*	100 Gm.
Alcohol,	
Water,	
Diluted Alcohol, each, *a sufficient quantity,*	
To make about *one thousand milliliters*	1000 mils

Heat *four hundred mils* of water to boiling, and pour it on the granulated opium contained in a tared vessel, and weigh; then stir the mixture occasionally during twelve hours, restore the original weight by the addition of water, add *four hundred mils* of alcohol, pour the mixture into a bottle, and continue the maceration for forty-eight hours, occasionally shaking the mixture. Then transfer the mixture to a percolator, return the first portion of the percolate until it runs through clear, and, when the original menstruum has ceased to drop, continue the percolation slowly, gradually adding sufficient diluted alcohol to make the percolate measure *nine hundred and fifty mils.*

Assay a portion of this percolate, as directed below, and, from the morphine content thus determined, ascertain by calculation the amount of anhydrous morphine in the remainder of the liquid and adjust the volume of the finished Tincture so that each *one hundred mils* contains 1 Gm. of anhydrous morphine.

Assay—Evaporate 80 mils of Tincture of Opium on a water bath until the alcohol is all removed. Then proceed as directed in the assay under *Opium,* page 306, thirteenth line of the Assay, beginning with the word "Transfer." The result of the assay indicates the amount of morphine obtained from 40 mils of the Tincture of Opium.

Average dose—Metric, 0.5 mil—Apothecaries, 8 minims.

TINCTURA OPII CAMPHORATA

Camphorated Tincture of Opium

Tr. Opii Camph.—Paregoric Opii tinctura benzoici P.I.

Powdered Opium, *four grammes*	4 Gm.
Benzoic Acid, *four grammes*	4 Gm.
Camphor, *four grammes*	4 Gm.
Oil of Anise, *four milliliters*	4 mils
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process M (see page 445), macerating the above ingredients in a mixture of *forty mils* of glycerin and *nine hundred and fifty mils* of diluted alcohol. Complete the preparation with diluted alcohol.

Preparation—Mistura Glycyrrhizæ Composita.

AVERAGE DOSE—Metric, 4 mils—Apothecaries, 1 fluidrachm.

TINCTURA OPII DEODORATI

Tincture of Deodorized Opium

Tr. Opii Deod.

One hundred mils of Tincture of Deodorized Opium yields not less than 0.95 Gm. nor more than 1.05 Gm. of anhydrous morphine.

GRANULATED OPIUM, *one hundred grammes*.............	100 Gm.
PURIFIED PETROLEUM BENZIN, *seventy-five milliliters*....	75 mils
ALCOHOL, *two hundred milliliters*......................	200 mils
WATER, *a sufficient quantity,*	
To make about *one thousand milliliters*.....	1000 mils

Heat *five hundred mils* of water to boiling, and pour it on the granulated opium contained in a suitable vessel, stirring the mixture frequently during twenty-four hours. Then transfer the mixture to a percolator, return the first portion of the percolate until it runs through clear, and, when the original menstruum has ceased to drop, continue the percolation slowly, gradually adding water until the opium is practically exhausted.

Concentrate the percolate, by evaporation on a water bath, until it measures *one hundred and fifty mils;* cool, transfer it to a bottle, add *sixty-five mils* of purified petroleum benzin, stopper, and shake the mixture frequently during ten minutes. Separate the benzin layer and repeat the shaking out with the remainder of the purified petroleum benzin, carefully and completely separating the benzin layer each time. Allow the aqueous liquid to evaporate spontaneously in a warm place until the odor of benzin has almost disappeared, remove the last traces by cautiously heating on a water bath and then add *six hundred mils* of water. Filter the liquid, add the alcohol and wash the residue on the filter with sufficient water to make the product measure *nine hundred and fifty mils.*

Assay a portion of this filtrate as directed below, and, from the morphine content thus determined, ascertain by calculation the amount of anhydrous morphine in the remainder of the liquid and adjust the volume of the finished Tincture so that each *one hundred mils* contains 1 Gm. of anhydrous morphine.

Assay—Proceed as directed in the assay under *Tinctura Opii.*

AVERAGE DOSE—Metric, 0.5 mil—Apothecaries, 8 minims.

TINCTURA PHYSOSTIGMATIS

Tincture of Physostigma

Tr. Physostig.—Tincture of Calabar Bean

One hundred mils of Tincture of Physostigma yields not less than 0.013 Gm. nor more than 0.017 Gm. of the alkaloids of physostigma.

PHYSOSTIGMA, in No. 50 powder, *one hundred grammes*...	100 Gm.
To make about *one thousand milliliters*......	1000 mils

Prepare a Tincture by Type Process P, as modified for assayed tinctures (see page 444), using alcohol as the menstruum and adjusting the volume of the finished Tincture so that each *one hundred mils* contains 0.015 Gm. of the alkaloids of physostigma.

Assay—Evaporate 150 mils of Tincture of Physostigma on a water bath until it measures about 20 mils, add 10 Gm. of sawdust purified (see Reagents, Part II) to the liquid and incorporate it thoroughly. Continue the evaporation on a water bath until the mixture is dry, then transfer the impregnated sawdust to a 250 mil flask, and proceed as directed in the assay under *Physostigma,* page 320, second line of the Assay, beginning with the words "and add 150 mils of ether," modifying the process there given by using the solution of sodium bicarbonate, in divided portions, to rinse the evaporating dish.

AVERAGE DOSE—Metric, 1 mil—Apothecaries, 15 minims.

TINCTURA PYRETHRI

Tincture of Pyrethrum

Tr. Pyreth.—Tincture of Pellitory

PYRETHRUM, in No. 50 powder, *two hundred grammes*	200 Gm.
To make *one thousand milliliters*..........	1000 mils

Prepare a Tincture by Type Process P (see page 444), using alcohol as the menstruum.

TINCTURA QUASSIÆ

Tincture of Quassia

Tr. Quas.

QUASSIA, in No. 50 powder, *two hundred grammes*	200 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process P (see page 444), using a mixture of *one volume* of alcohol and *two volumes* of water as the menstruum.

AVERAGE DOSE—Metric, 2 mils—Apothecaries, 30 minims.

TINCTURA RHEI

Tincture of Rhubarb

Tr. Rhei

RHUBARB, in No. 40 powder, *two hundred grammes*	200 Gm.
CARDAMOM SEED, in No. 40 powder, *thirty grammes*	30 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process P (see page 444), using a mixture of *one hundred mils* of glycerin, *five hundred mils* of alcohol and *four hundred mils* of water as the first menstruum and completing the percolation with diluted alcohol.

AVERAGE DOSE—Metric, 4 mils—Apothecaries, 1 fluidrachm.

TINCTURA RHEI AROMATICA

Aromatic Tincture of Rhubarb

Tr. Rhei Arom.

RHUBARB, in No. 40 powder, *two hundred grammes*	200 Gm.
SAIGON CINNAMON, in No. 40 powder, *forty grammes*	40 Gm.
CLOVE, in No. 40 powder, *forty grammes*	40 Gm.
MYRISTICA, in No. 40 powder, *twenty grammes*	20 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process P (see page 444), using a mixture of *one hundred mils* of glycerin, *five hundred mils* of alcohol and *four hundred mils* of water as the first menstruum and completing the percolation with diluted alcohol.

Preparation—Syrupus Rhei Aromaticus.

AVERAGE DOSE—Metric, 2 mils—Apothecaries, 30 minims.

TINCTURA SANGUINARIÆ

Tincture of Sanguinaria

Tr. Sanguin.—Tincture of Bloodroot

Sanguinaria, in No. 60 powder, *one hundred grammes* . . .	100 Gm.
Hydrochloric Acid, *ten milliliters*	10 mils
Alcohol,	
Water, each, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Mix *six hundred mils* of alcohol with *four hundred mils* of water. Moisten the drug with a mixture of the hydrochloric acid and *thirty mils* of this menstruum, transfer it to a percolator, and, without pressing the powder, allow it to stand, well covered, for six hours; then pack it firmly and pour on enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for twenty-four hours. Then allow the percolation to proceed slowly, pouring on sufficient menstruum, made of alcohol and water, in the same proportion as before, to make *one thousand mils* of Tincture.

Average dose—Metric, 1 mil—Apothecaries, 15 minims.

TINCTURA SCILLÆ

Tincture of Squill

Tr. Scill.

If assayed biologically the minimum lethal dose should not be greater than 0.006 mil of Tincture, or the equivalent in Tincture of 0.0000005 Gm. of ouabain, for each gramme of body weight of frog.

Squill, in No. 20 powder, *one hundred grammes*	100 Gm.
Alcohol,	
Water, each, *a sufficient quantity,*	
To make *one thousand milliliters*	1000 mils

Moisten the drug with sufficient menstruum, prepared by mixing *three volumes* of alcohol and *one volume* of water, and macerate it in a closed vessel in a moderately warm place for twenty-four hours, stirring occasionally. Then transfer it to a percolator, shake it down evenly without packing and pour on enough of the menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for twenty-four hours. Then allow the percolation to proceed slowly, gradually adding sufficient of the same menstruum to make *one thousand mils* of Tincture.

Assay—For a method of assaying Tincture of Squill, see Biological Assays (Part II).

Average dose—Metric, 1 mil—Apothecaries, 15 minims.

TINCTURA STRAMONII

Tincture of Stramonium

Tr. Stramon.

One hundred mils of Tincture of Stramonium yields not less than 0.0225 Gm. nor more than 0.0275 Gm. of the total alkaloids of stramonium.

Stramonium, in No. 60 powder, *one hundred grammes*...	100 Gm.
To make about *one thousand milliliters*.....	1000 mils

Prepare a Tincture by Type Process P, as modified for assayed tinctures (see page 441), using diluted alcohol as the menstruum and adjusting the volume of the finished Tincture so that each *one hundred mils* contains 0.025 Gm. of the total alkaloids of stramonium.

Assay—Evaporate 100 mils of Tincture of Stramonium on a water bath until it measures about 10 mils, transfer the evaporated liquid to a separator, and proceed as directed in the assay under *Fluidextractum Belladonnæ Radicis*, page 178, second line of the Assay, beginning with the words "add 10 mils," and modifying the process there given by using the ammonia water and about 5 mils of distilled water in addition to rinse the dish in which the Tincture was evaporated; before titrating treat the residue twice with 5 mils of ether, evaporating to dryness each time.

Average dose—Metric, 0.5 mil—Apothecaries, 8 minims.

TINCTURA STROPHANTHI

Tincture of Strophanthus

Tr. Strophanth.—Strophanthi tinctura P.I.

If assayed biologically the minimum lethal dose should not be greater than 0.00006 mil of Tincture, or the equivalent in Tincture of 0.0000005 Gm. of ouabain, for each gramme of body weight of frog.

Strophanthus, in No. 10 powder, *one hundred grammes*.	100 Gm.
To make *one thousand milliliters*..........	1000 mils

Pack the drug in a cylindrical percolator and slowly percolate it with purified petroleum benzin until a few drops of the percolate, evaporated from filter paper, no longer leaves a greasy stain; then remove the strophanthus from the percolator and expose it to the air until it is dry and the odor of benzin has disappeared. Prepare a Tincture from this dried drug by Type Process P (see page 444), using alcohol as the menstruum, but allow the moistened drug to macerate for forty-eight hours before starting the percolation, instead of twenty-four hours as directed in Type Process P.

Assay—For a method of assaying Tincture of Strophanthus, see Biological Assays (Part II).

AVERAGE DOSE—Metric, 0.5 mil—Apothecaries, 8 minims.

TINCTURA TOLUTANA

Tincture of Tolu

Tr. Tolu.—Tolu Tincture

BALSAM OF TOLU, *two hundred grammes*	200 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process M (see page 445), using alcohol as the solvent.

Preparation—Syrupus Tolutanus.

AVERAGE DOSE—Metric, 2 mils –Apothecaries, 30 minims.

TINCTURA VALERIANÆ

Tincture of Valerian

Tr. Valer.

VALERIAN, in No. 40 powder, *two hundred grammes*......	200 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process P (see page 444), using a mixture of *three volumes* of alcohol and *one volume* of water as the menstruum.

AVERAGE DOSE—Metric, 4 mils—Apothecaries, 1 fluidrachm.

TINCTURA VALERIANÆ AMMONIATA

Ammoniated Tincture of Valerian

Tr. Valer. Ammon.

Valerian, in No. 40 powder, *two hundred grammes*	200 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process P (see page 444), using aromatic spirit of ammonia as the menstruum.

Average dose—Metric, 2 mils—Apothecaries, 30 minims.

TINCTURA VERATRI VIRIDIS

Tincture of Veratrum Viride

Tr. Verat. Vir.

Veratrum Viride, in No. 60 powder, *one hundred grammes*	100 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process P (see page 444), using alcohol as the menstruum.

Average dose—Metric, 0.5 mil—Apothecaries, 8 minims.

TINCTURA ZINGIBERIS

Tincture of Ginger

Tr. Zingib.—Tincture of Jamaica Ginger

Jamaica Ginger, in No. 30 powder, *two hundred grammes*	200 Gm.
To make *one thousand milliliters*	1000 mils

Prepare a Tincture by Type Process P (see page 444), using alcohol as the menstruum.

Evaporate 10 Gm. of Tincture of Ginger to dryness in a tared dish on a water bath; the yield of residue does not exceed 2 per cent. When treated with 20 mils of cold distilled water, not more than 15 per cent. of this residue dissolves.

Evaporate 10 mils of Tincture of Ginger to dryness in a small flask. Add 5 mils of half-normal alcoholic potassium hydroxide V.S. and boil the mixture gently for thirty minutes under a reflux condenser. Remove the condenser and evaporate the alcohol on a water bath. Then add 50 mils of distilled water to the residue, agitate the mixture, filter it and transfer the aqueous filtrate to a separatory funnel and shake it out with 25 mils of ether. Evaporate the separated ether solution spontaneously by adding it, a few drops at a time, to the center of a watch glass. Cautiously apply the tip of the tongue to the dry residue; the taste should be slightly camphoraceous but not sharp or bitingly-pungent (*capsicum or similar pungent substitute*).

It contains about 90 per cent. of $C_2H_5.OH$ by volume.

Preparation—Acidum Sulphuricum Aromaticum.

AVERAGE DOSE—Metric, 2 mils—Apothecaries, 30 minims.

TOXITABELLÆ HYDRARGYRI CHLORIDI CORROSIVI

Poison Tablets of Corrosive Mercuric Chloride

Toxitabel. Hydrarg. Chlor. Corr.—Corrosive Sublimate Tablets Bichloride Tablets

Tablets of an angular shape (not discoid), each having the word "POISON" and the skull and cross bones design distinctly stamped upon it. Each tablet weighs about 1 Gm. and contains not less than 0.45 Gm. nor more than 0.55 Gm. of corrosive mercuric chloride ($HgCl_2$); the remainder consisting chiefly of sodium chloride (NaCl). The tablets are to be colored blue, preferably with sodium indigotindisulphonate. Poison Tablets of Corrosive Mercuric Chloride are to be dispensed in securely stoppered glass containers on the exterior of which is placed a red label bearing the word "POISON" and a statement indicating that the Tablets contain the required amount of corrosive mercuric chloride.

Assay—Proceed as directed under *Hydrargyri Chloridi Corrosivum*, using one tablet and washing the sulphide with distilled water until the filtrate is colorless and 5 mils of the washings, acidulated with nitric acid, yields no turbidity on the addition of a few drops of silver nitrate T.S.

The weight of the mercuric sulphide obtained, multiplied by 1.167, indicates its equivalent in corrosive mercuric chloride.

Tablets of Corrosive Mercuric Chloride may also be assayed as directed under the Electrolytic Method (see Part II, Test No. 4).

Each tablet shows not less than 0.45 Gm. nor more than 0.55 Gm. of $HgCl_2$.

TRAGACANTHA

Tragacanth

Trag.—Gum Tragacanth

The spontaneously dried gummy exudation from the stems of *Astragalus gummifer* Labillardière, or from other Asiatic species of *Astragalus* (Fam. *Leguminosæ*).

In flattened, lamellated fragments varying from ribbon-shaped bands to long and linear pieces, which may be either straight or spirally twisted, and from 0.5 to 2.5 mm. in thickness; whitish to light brown in color, translucent and horny; fracture short; rendered more easily pulverizable by heating to 50° C.; inodorous; taste insipid, mucilaginous.

Under the microscope, sections made from Tragacanth, previously softened in water, and mounted in glycerin, show the lamellæ of mucilaginous walls and a few starch grains, the latter being mostly spherical and single, occasionally 2- to 3-compound, the individual grains from 0.003 to 0.025 mm. in diameter and colored blue with iodine. Indian Gum, derived from plants of uncertain origin, upon similar treatment and examination, shows numerous threads of a granular substance, sometimes the hyphæ of a fungus and chains of bacteria, and occasional fragments of a yellowish-brown or reddish-brown color, containing lignified wood-fibers, a few rosette aggregates of calcium oxalate, from 0.02 to 0.03 mm. in diameter, and a few spherical starch grains, from 0.003 to 0.007 mm. in diameter.

Add 1 Gm. of Tragacanth to 50 mils of distilled water; it swells and forms a smooth, nearly uniform, stiff, opalescent mucilage free from cellular fragments. Indian Gum upon similar treatment forms an uneven mucilage containing a few reddish-brown fragments, and on stirring separates in the form of coarse, uneven strings.

Shake 2 Gm. of Tragacanth with 100 mils of water until fully swollen and free from lumps, and then add 2 Gm. of powdered sodium borate and shake the mixture thoroughly until the salt is dissolved; the mucilage does not lose its transparency, nor exhibit any change in consistence, and on pouring is not slimy or stringy, even after standing twenty-four hours (*foreign gums*).

Boil 1 Gm. of Tragacanth with 20 mils of water until a mucilage is formed, then add 5 mils of hydrochloric acid and again boil the mixture for five minutes; it develops no pink or red color (*Indian Gum*).

The powder is whitish; forming with water a translucent mucilage and under the microscope exhibiting numerous starch grains, from 0.003 to 0.025 mm. in diameter, varying from spherical to elliptical, with occasional 2- to 4-compound grains, many of the grains being swollen and more or less altered, due to the drying of the Tragacanth before powdering. Powdered Indian Gum shows numerous fragments of lignified vegetable tissue.

Tragacanth yields not more than 3.5 per cent. of ash.

Preparation—Mucilago Tragacanthæ.

TRINITROPHENOL

Trinitrophenol

Trinitrophen.—Picric Acid

Trinitrophenol [$C_6H_3O_7N_3$ or $C_6H_2(OH)(NO_2)_3$ 1:2:4:6 = 229.05]. Preserve it in well-stoppered bottles, in a cool place, remote from fire.

Caution—For safety in transportation it is usually mixed with about 20 per cent. of water. Before applying the tests described below, dry the Trinitrophenol to constant weight in a desiccator over sulphuric acid.

Trinitrophenol occurs in pale yellow, rhombic prisms or scales; odorless, and having an intensely bitter taste. It explodes when heated rapidly and when subjected to percussion.

One Gm. of Trinitrophenol dissolves in 78 mils of water, 12 mils of alcohol, 35 mils of chloroform, 65 mils of ether, and in 10 mils of benzene at 25° C.; also in 15 mils of boiling water.

An aqueous solution of Trinitrophenol is acid to litmus.

It melts between 121° and 123° C.

An aqueous solution of Trinitrophenol (1 in 100) has a yellow color, which becomes darker on the addition of alkalies, and red on the addition of ammonium sulphide T.S. or a solution of an alkaline cyanide.

Add a few drops of barium chloride T.S. to 10 mils of an aqueous solution of Trinitrophenol (1 in 100); the liquid does not at once become opalescent (*sulphate*).

Dissolve 2 Gm. of Trinitrophenol in 50 mils of benzene, collect the insoluble residue, if any, on a small filter which has been dried at 100° C. and weighed. Wash the residue and filter with benzene until the washings are colorless. The residue, dried at 100° C., does not exceed 0.2 per cent.

AVERAGE DOSE—Metric, 0.03 Gm.—Apothecaries, ½ grain.

TRITICUM

Triticum

Tritic.—Couch Grass Dog Grass

The dried rhizome and roots of *Agropyron repens* (Linné) Beauvois (Fam. *Gramineæ*), gathered in the spring.

Usually in pieces from 4 to 12 mm. in length and from 1 to 2.5 mm. in diameter; externally light yellow or yellowish-brown, longitudinally furrowed, smooth, lustrous, nodes with circular leaf-scars, a few root-scars and occasional slender roots; fracture tough, fibrous; internally lemon-yellow and with a large, hollow pith; odor slight, aromatic; taste sweetish.

Roots filiform, irregularly branching, attaining a length of about 5 cm. and not more than 0.5 mm. in thickness, light brown or yellowish-brown, frequently covered with long root hairs.

Under the microscope, transverse sections of Triticum show a single layer of strongly lignified epidermal cells; a hypodermis of from 3 to 6 rows of more or less polygonal cells with strongly lignified walls; a cortex of from 10 to 16 rows of thin-walled parenchyma cells, occasionally with nearly spherical starch grains about 0.005 mm. in diameter, or with irregular masses of a more or less soluble carbohydrate; among the parenchyma cells and near the hypodermis occur small, widely separated fibro-vascular bundles, each with a closed sheath of sclerenchymatous fibers; an endodermis, the lateral and inner walls of the cells moderately thickened, strongly lignified and somewhat porous; several layers of sclerenchymatous fibers immediately inside the endodermal ring, in which are imbedded an interrupted circle of collateral fibro-vascular bundles having large tracheæ; adjoining these are usually 8 to 10 rows of parenchyma cells with a few fibro-vascular bundles and a pith in which the parenchyma cells are more or less broken or absent.

The powder is light yellowish; consisting of irregular, lignified fragments; numerous fragments showing tracheæ with annular or spiral thickenings or marked with simple pores and associated with long, narrow, rather thin-walled, strongly lignified sclerenchymatous fibers; fragments of epidermis made up of cells rectangular in outline, the longer walls considerably thickened, strongly lignified and marked with numerous transverse pores; ends of epidermal cells usually separated from each other by a very narrow cell with thin walls and few pores; numerous fragments of parenchyma rectangular in outline and with thin, porous walls.

Triticum yields not more than 3 per cent. of ash.

Preparation—Fluidextractum Tritici.

AVERAGE DOSE—Metric, 8 Gm.—Apothecaries, 2 drachms.

TRITURATIONES

Triturations

Unless otherwise directed, Triturations are to be prepared according to the following formula:

Take of

The Substance, *ten grammes*	10 Gm.
Sugar of Milk, in moderately fine powder, *ninety grammes*	90 Gm.
To make *one hundred grammes*	100 Gm.

Weigh the substance and the sugar of milk separately; then place the substance, previously reduced, if necessary, to a moderately fine powder, in a mortar; add about an equal measure of sugar of milk, mix well by means of a spatula, and triturate the powders thoroughly together. Then add fresh portions of the sugar of milk, from time to time, until the whole is added, and continue the trituration after each addition until the substance is intimately mixed with the sugar of milk and reduced to a fine powder.

TRITURATIO ELATERINI

Trituration of Elaterin

Trit. Elaterin.

Elaterin, *ten grammes*	10 Gm.
Sugar of Milk, in moderately fine powder, *ninety grammes*	90 Gm.
To make *one hundred grammes*	100 Gm.

Mix them thoroughly by trituration (see *Triturationes*).

Average dose—Metric, 0.03 Gm.—Apothecaries, ½ grain.

TROCHISCI ACIDI TANNICI

Troches of Tannic Acid

Troch. Acid. Tann.

Tannic Acid, *six grammes*	6 Gm.
Sugar, in fine powder, *sixty-five grammes*	65 Gm.
Tragacanth, in fine powder, *two grammes*	2 Gm.
Stronger Orange Flower Water, *a sufficient quantity,*	
To make *one hundred troches*	100

Rub the powders together until they are thoroughly mixed; then form a mass with stronger orange flower water and divide it into *one hundred troches.*

TROCHISCI AMMONII CHLORIDI

Troches of Ammonium Chloride

Troch. Ammon. Chlor.

Ammonium Chloride, in fine powder, *ten grammes*	10 Gm.
Extract of Glycyrrhiza, in fine powder, *twenty grammes*	20 Gm.
Tragacanth, in fine powder, *two grammes*	2 Gm.
Sugar, in fine powder, *forty grammes*	40 Gm.
Syrup of Tolu, *a sufficient quantity,*	
To make *one hundred troches*	100

Rub the powders together until they are thoroughly mixed; then form a mass with syrup of tolu and divide it into *one hundred troches.*

TROCHISCI CUBEBÆ

Troches of Cubeb

Troch. Cubeb.

Oleoresin of Cubeb, *two grammes*	2 Gm.
Oil of Sassafras, *one milliliter*	1 mil
Extract of Glycyrrhiza, in fine powder, *twenty-five grammes*	25 Gm.
Acacia, in fine powder, *twelve grammes*	12 Gm.
Syrup of Tolu, *a sufficient quantity,*	
To make *one hundred troches*	100

Rub the powders together until they are thoroughly mixed; then add the oleoresin and the oil, and incorporate them with the mixture. Lastly form a mass with syrup of tolu and divide it into *one hundred troches.*

TROCHISCI POTASSII CHLORATIS

Troches of Potassium Chlorate

Troch. Pot. Chlorat.

Potassium Chlorate, in fine powder, *fifteen grammes*	15 Gm.
Sugar, in fine powder, *sixty grammes*	60 Gm.
Tragacanth, in fine powder, *three grammes*	3 Gm.
Water, *a sufficient quantity,*	
To make *one hundred troches*	100

Mix the sugar with the tragacanth by trituration in a mortar; then transfer the mixture to a sheet of paper, and by means of a bone or wooden spatula mix it with the potassium chlorate, being careful to avoid unnecessary trituration or pressure, which might cause the mixture to ignite or explode. Lastly form a mass with water and divide into *one hundred troches.*

TROCHISCI SODII BICARBONATIS

Troches of Sodium Bicarbonate

Troch. Sod. Bicarb.

SODIUM BICARBONATE, *eighteen grammes*	18 Gm.
SUGAR, in fine powder, *fifty-four grammes*	54 Gm.
MYRISTICA, freshly grated, *one gramme*	1 Gm.
MUCILAGE OF TRAGACANTH, *a sufficient quantity,*	
To make *one hundred troches*	100

Triturate the myristica with the sugar, gradually added, until they are reduced to a fine powder, and mix this intimately with the sodium bicarbonate; then form a mass with the mucilage of tragacanth and divide it into *one hundred troches.*

ULMUS

Elm

Elm Bark Slippery Elm

The bark of *Ulmus fulva* Michaux (Fam. *Ulmaceæ*), deprived of the outer corky layer and dried.

Usually in bundles consisting of flat, oblong pieces, about 30 cm. in length and from 10 to 15 cm. in width; outer surface of a light brown or buff color with occasional dark brown patches of adhering cork, longitudinally striate and with detachable bundles of bast-fibers, and colored blackish upon the addition of a very diluted iodine T.S.; inner surface light yellowish-brown, nearly smooth and finely striate, only slightly darkened upon the addition of a very diluted iodine T.S.; fracture fibrous with projecting bast-fibers, the broken surface porous, due to the large mucilage cells; odor distinct; taste mucilaginous.

The powder is very light brown; under the microscope it shows mostly fibrous fragments, and a finely granular portion made up of small starch grains, the latter being immediately colored bluish-black upon the addition of iodine T.S.; starch grains mostly spherical or more or less polygonal, usually about 0.003 mm. in diameter, but also attaining a diameter of 0.025 mm.; bast-fibers very long, about 0.02 mm. in diameter, with rather thin, slightly lignified walls; calcium oxalate in monoclinic prisms, mostly in crystal fibers, the individual crystals from 0.01 to 0.025 mm. in diameter; fragments of large mucilage cells with adhering starch grains.

Macerate 1 Gm. of powdered Elm with 40 mils of distilled water for an hour and forcibly strain; the solution is of a mucilaginous consistence.

UNGUENTUM

Ointment

Ung.—Simple Ointment

White Wax, *two hundred grammes*	200 Gm.
Benzoinated Lard, *eight hundred grammes*	800 Gm.
To make *one thousand grammes*	1000 Gm.

Melt the white wax, add the benzoinated lard, and heat gently until liquefied; then stir the mixture until it congeals. For use in southern latitudes and during the warm season in other localities, 50 Gm. of the benzoinated lard (or more if necessary) may be replaced by an equal quantity of white wax.

UNGUENTUM ACIDI BORICI

Ointment of Boric Acid

Ung. Acid. Bor.

Boric Acid, in fine powder, *one hundred grammes*	100 Gm.
Paraffin, *fifty grammes*	50 Gm.
White Petrolatum, *eight hundred and fifty grammes*	850 Gm.
To make about *one thousand grammes*	1000 Gm.

Melt the paraffin, add the white petrolatum, and heat gently until liquefied. Then gradually add the hot liquid to the boric acid, contained in a warm mortar, triturating thoroughly, and stir the mixture until it congeals.

UNGUENTUM ACIDI TANNICI

Ointment of Tannic Acid

Ung. Acid. Tann.

Tannic Acid, *twenty grammes*	20 Gm.
Glycerin, *twenty grammes*	20 Gm.
Ointment, *sixty grammes*	60 Gm.
To make *one hundred grammes*	100 Gm.

Dissolve the tannic acid in the glycerin with the aid of a gentle heat, and mix the solution thoroughly with the ointment, avoiding the use of iron utensils.

UNGUENTUM AQUÆ ROSÆ

Ointment of Rose Water

Ung. Aq. Ros.

Spermaceti, *one hundred and twenty-five grammes*	125 Gm.
White Wax, *one hundred and twenty grammes*	120 Gm.
Expressed Oil of Almond, *five hundred and sixty grammes*	560 Gm.
Sodium Borate, in fine powder, *five grammes*	5 Gm.
Stronger Rose Water, *one hundred and ninety grammes*	190 Gm.
To make about *one thousand grammes*	1000 Gm.

Reduce the spermaceti and the white wax to fine pieces and melt them on a water bath, add the expressed oil of almond and stir, continuing the heat until the mixture is uniform. Dissolve the sodium borate in the stronger rose water warmed on a water bath to the temperature of the melted wax and fat, and add the warm solution gradually to the melted mixture, stirring it rapidly and continuously until it congeals and becomes of uniform consistence.

Ointment of Rose Water must be free from rancidity. If the Ointment has been chilled, warm it slightly before attempting to incorporate other ingredients with it.

UNGUENTUM BELLADONNÆ

Belladonna Ointment

Ung. Bellad.

Pilular Extract of Belladonna Leaves, *ten grammes*	10 Gm.
Diluted Alcohol, *five milliliters*	5 mils
Hydrous Wool Fat, *thirty grammes*	30 Gm.
Benzoinated Lard, *fifty-five grammes*	55 Gm.
To make about *one hundred grammes*	100 Gm.

Triturate the extract with the diluted alcohol until a smooth mixture is obtained; with this incorporate the hydrous wool fat; then add the benzoinated lard and mix thoroughly.

UNGUENTUM CHRYSAROBINI

Chrysarobin Ointment

Ung. Chrysarobin.

Chrysarobin, *six grammes*	6 Gm.
Benzoinated Lard, *ninety-four grammes*	94 Gm.
To make *one hundred grammes*	100 Gm.

Triturate the chrysarobin with the benzoinated lard previously melted, and heat the mixture on a water bath for twenty minutes, with occasional stirring; then strain and stir until it congeals.

UNGUENTUM DIACHYLON

Diachylon Ointment

Ung. Diachyl.

Lead Plaster, *fifty grammes*	50 Gm.
Oil of Lavender, *one gramme*	1 Gm.
White Petrolatum, *forty-nine grammes*	49 Gm.
To make *one hundred grammes*	100 Gm.

Melt together the lead plaster and the white petrolatum by applying a gentle heat, strain the mixture, allow it to cool but not congeal, add the oil of lavender, and stir the Ointment until it is cold.

UNGUENTUM GALLÆ

Nutgall Ointment

Ung. Gall.

Nutgall, in very fine powder, *twenty grammes*	20 Gm.
Ointment, *eighty grammes*	80 Gm.
To make *one hundred grammes*	100 Gm.

Rub the nutgall with the ointment, gradually added, until they are thoroughly mixed. Avoid the use of metallic utensils.

UNGUENTUM HYDRARGYRI

Mercurial Ointment

Ung. Hydrarg.

Mercury, *five hundred grammes*	500 Gm.
Oleate of Mercury, *twenty grammes*	20 Gm.

Prepared Suet, *two hundred and thirty grammes*	230 Gm.
Benzoinated Lard, *two hundred and fifty grammes*	250 Gm.
To make *one thousand grammes*	1000 Gm.

Triturate the oleate of mercury in a warm mortar, with the mercury added gradually, and when the globules are completely divided and distributed, set it aside for about fifteen minutes. Melt the lard and suet, allow the mixture to partially cool, add about *twenty-five grammes* of it to the mercurial mixture, and continue the trituration until globules of mercury are no longer visible under a lens magnifying ten diameters. Then add the remainder of the lard and suet and mix thoroughly.

Assay—Weigh 10 Gm. of Mercurial Ointment in a tared dish, melt it, then remove it from the fire and add 50 mils of warm purified petroleum benzin. Stir the mixture well, allow the mercury to settle completely, and decant the benzin. Wash the residue with successive portions of 10 mils each of warm purified petroleum benzin until it is entirely free from fatty matter, carefully retaining all of the separated Mercury in the dish, and allowing all traces of the benzin to evaporate. Add to the residue 10 mils of diluted hydrochloric acid, heat it gently and stir with a glass rod until the mercury collects in a globule. Pour off the acid, warm the mercury with a little distilled water, dry the globule on bibulous paper, and weigh. The separated mercury weighs not less than 4.9 Gm. nor more than 5.1 Gm.

Preparation—Unguentum Hydrargyri Dilutum.

UNGUENTUM HYDRARGYRI AMMONIATI

Ointment of Ammoniated Mercury

Ung. Hydrarg. Ammon.—White Precipitate Ointment

Ammoniated Mercury, in very fine powder, *ten grammes*	10 Gm.
White Petrolatum, *fifty grammes*	50 Gm.
Hydrous Wool Fat, *forty grammes*	40 Gm.
To make *one hundred grammes*	100 Gm.

Rub the ammoniated mercury with an equal weight of the melted white petrolatum, then add the remainder of the melted white petrolatum, mix thoroughly with the hydrous wool fat, and stir the mixture until it congeals.

UNGUENTUM HYDRARGYRI DILUTUM

Diluted Mercurial Ointment

Ung. Hydrarg. Dil.—Blue Ointment Hydrargyri unguentum P.I.

Mercurial Ointment, *six hundred grammes*	600 Gm.
Petrolatum, *four hundred grammes*	400 Gm.
To make *one thousand grammes*	1000 Gm.

Mix them thoroughly. For use in southern latitudes or during the warm season in other localities, 50 Gm. of the petrolatum (or more, if necessary) may be replaced by an equal quantity of yellow wax.

Assay—Proceed as directed in the assay under *Unguentum Hydrargyri*. The separated mercury weighs not less than 2.9 Gm. nor more than 3.1 Gm.

UNGUENTUM HYDRARGYRI NITRATIS

Ointment of Mercuric Nitrate

Ung. Hydrarg. Nit.—Citrine Ointment

Mercury, *seven grammes*	7.0 Gm.
Nitric Acid, *seventeen and five-tenths grammes*	17.5 Gm.
Lard, free from water, *seventy-six grammes*	76.0 Gm.
To make about *one hundred grammes*	100 Gm.

Warm the lard in a capacious porcelain dish until it has just melted, or to about 45° C. Add *seven grammes* of the nitric acid all at once and continue the heat until the characteristic reaction is complete. Hold an inverted glass funnel over the dish to protect the operator from any lard spurting from the dish during the reaction. Withdraw the heat immediately after the rapid rise of froth which accompanies the end reaction and cool the treated lard, stirring it until it assumes a bright citrine color. Dissolve the mercury in the remainder of the nitric acid, warming it if necessary to prevent crystallizing, and mix the solution with the previously prepared lard. All contact with metallic utensils or containers must be avoided.

UNGUENTUM HYDRARGYRI OXIDI FLAVI

Ointment of Yellow Mercuric Oxide

Ung. Hydrarg. Oxid. Flav.

Yellow Mercuric Oxide, in very fine powder, *ten grammes*	10 Gm.
Water, *ten grammes*	10 Gm.
Hydrous Wool Fat, *forty grammes*	40 Gm.
Petrolatum, *forty grammes*	40 Gm.
To make *one hundred grammes*	100 Gm.

Triturate the yellow mercuric oxide with the water until the mixture is perfectly smooth, then add the hydrous wool fat in divided portions, and incorporate thoroughly with the petrolatum. All contact with metallic utensils or containers must be avoided.

UNGUENTUM IODI

Iodine Ointment

Ung. Iodi

Iodine, *four grammes*	4 Gm.
Potassium Iodide, *four grammes*	4 Gm.
Glycerin, *twelve grammes*	12 Gm.
Benzoinated Lard, *eighty grammes*	80 Gm.
To make *one hundred grammes*	100 Gm.

Triturate the iodine and potassium iodide in a glass mortar with the glycerin until dissolved, then gradually incorporate the benzoinated lard and mix thoroughly. All contact with metallic utensils or containers must be avoided. This Ointment must not be dispensed unless it has been recently prepared.

UNGUENTUM IODOFORMI

Iodoform Ointment

Ung. Iodof.

Iodoform, in very fine powder, *ten grammes*	10 Gm.
Benzoinated Lard, *ninety grammes*	90 Gm.
To make *one hundred grammes*	100 Gm.

Triturate the iodoform thoroughly with about twice its weight of the benzoinated lard, then incorporate the remainder of the benzoinated lard.

UNGUENTUM PHENOLIS

Ointment of Phenol

Ung. Phenol.—Ointment of Carbolic Acid

Liquefied Phenol, *two and twenty-five hundredths grammes*	2.25 Gm.
Ointment, *ninety-seven and seventy-five hundredths grammes*	97.75 Gm.
To make *one hundred grammes*	100 Gm.

Add the liquefied phenol to the melted ointment and stir the mixture until it begins to congeal.

UNGUENTUM PICIS LIQUIDÆ

Tar Ointment

Ung. Pic. Liq.

Tar, *five hundred grammes*	500 Gm.
Yellow Wax, *one hundred and fifty grammes*	150 Gm.
Lard, *three hundred and fifty grammes*	350 Gm.
To make *one thousand grammes*	1000 Gm.

Melt the yellow wax, add the lard, and to the melted mixture add the tar, previously warmed, and incorporate thoroughly; strain through muslin, and stir the mixture until it congeals.

UNGUENTUM STRAMONII

Stramonium Ointment

Ung. Stramon.

Pilular Extract of Stramonium, *ten grammes*	10 Gm.
Diluted Alcohol, *five milliliters*	5 mils
Hydrous Wool Fat, *twenty grammes*	20 Gm.
Benzoinated Lard, *sixty-five grammes*	65 Gm.
To make about *one hundred grammes*	100 Gm.

Triturate the extract with the diluted alcohol until a smooth mixture is obtained; with this incorporate the hydrous wool fat, then add the benzoinated lard, and mix thoroughly.

UNGUENTUM SULPHURIS

Sulphur Ointment

Ung. Sulphur.

Sublimed Sulphur, *one hundred and fifty grammes*	150 Gm.
Benzoinated Lard, *eight hundred and fifty grammes*	850 Gm.
To make *one thousand grammes*	1000 Gm.

Rub the sublimed sulphur with the benzoinated lard, gradually added, until they are thoroughly mixed.

UNGUENTUM ZINCI OXIDI

Ointment of Zinc Oxide

Ung. Zinc. Ox.—Zinc Ointment

ZINC OXIDE, in very fine powder, *two hundred grammes* . .	200 Gm.
BENZOINATED LARD, *eight hundred grammes*	800 Gm.
To make *one thousand grammes*	1000 Gm.

Rub the zinc oxide, which must be free from gritty particles, with about one-fourth of the melted benzoinated lard, in a previously warmed container, and with this incorporate the remainder of the benzoinated lard, previously melted. If necessary, strain the Ointment while warm, and stir it thoroughly until it congeals.

URANII NITRAS

Uranium Nitrate

Uran. Nit.

It contains not less than 98 per cent. of $UO_2(NO_3)_2+6H_2O$ (502.62) (uranyl nitrate). Preserve it in well-closed containers, protected from light.

Uranium Nitrate occurs in the form of light yellow prisms; odorless and having a bitter, astringent taste; somewhat efflorescent; radio-active.

One Gm. of Uranium Nitrate dissolves in 1.2 mils of water at 25° C.; freely soluble in alcohol or ether.

Aqueous solutions of Uranium Nitrate are yellow and acid to litmus.

Separate portions of an aqueous solution of the salt (1 in 20) yield, with sodium hydroxide T.S. or ammonia water, a yellow precipitate insoluble in an excess of the reagent but soluble in ammonium carbonate T.S.; with ammonium sulphide T.S. a dark brown precipitate; and with sodium phosphate T.S. a yellow precipitate. Mix 2 mils of the aqueous solution with an equal volume of sulphuric acid, cool the mixture, and add a crystal of ferrous sulphate; a dark brown color appears around the crystal.

An aqueous solution of the salt does not respond to the Test for heavy metals (see Part II, Test No. 3).

An aqueous solution of the salt (1 in 20) remains clear after the addition of an equal volume of ammonium carbonate T.S. (*alkaline earths*). Dilute 3 mils of this mixture to 10 mils with distilled water and add 10 mils of hydrogen sulphide T.S.; no color or precipitate is produced (*iron, manganese, or zinc*).

A solution of 1 Gm. of Uranium Nitrate in 20 mils of distilled water, acidulated with 1 mil of diluted sulphuric acid, does not completely decolorize 0.1 mil of tenth-normal potassium permanganate V.S. (*uranous compounds*).

An aqueous solution of the salt (1 in 100) does not at once produce a turbidity with barium chloride T.S. (*sulphate*).

Assay—Dissolve about 0.4 Gm. of the salt, accurately weighed, in 100 mils of distilled water, heat the solution to boiling, add ammonia water until no further precipitate is produced, and allow the precipitate to settle. Then wash the precipitate well on a filter with an aqueous solution of ammonium nitrate (1 in

100), and afterwards moderately ignite it in a platinum crucible, with free access of air, until the weight is constant. The urano-uranic oxide (U_3O_8) so obtained corresponds to not less than 54.8 per cent. of the weight of the salt taken, which is equivalent to not less than 98 per cent. of $UO_2(NO_3)_2+6H_2O$.

AVERAGE DOSE—Metric, 0.01 Gm.—Apothecaries, ⅙ grain. Use with caution.

UVA URSI

Uva Ursi

Bearberry

The dried leaves of *Arctostaphylos Uva-ursi* (Linné) Sprengel (Fam. *Ericaceæ*), without the presence or admixture of more than 5 per cent. of stems or other foreign matter.

Usually more or less entire, laminæ obovate or oblong-spatulate, from 12 to 30 mm. in length and from 5 to 13 mm. in breadth; summits obtuse or rounded; margins entire, slightly revolute; bases cuneate, tapering into short, stout petioles; upper surfaces dark green, glabrous and shiny, finely reticulate; under surfaces yellowish-green and slightly pubescent, especially on the midribs; coriaceous, fracture short; odor aromatic, tea-like; taste astringent and somewhat bitter.

The powder is olive green; under the microscope it shows irregular fragments; epidermal cells polygonal, those of the lower surface showing broadly elliptical stomata about 0.035 mm. in length, surrounded by from 5 to 8 neighboring cells; cells of mesophyll with chloroplastids and frequently irregular masses of a carbohydrate; fragments of fibro-vascular bundles with spiral tracheæ associated with narrow, strongly lignified sclerenchymatous fibers and frequently also with crystal fibers with monoclinic prisms, from 0.006 to 0.015 mm. in diameter; numerous fragments made up of cells having a yellowish-brown content which are colored a bluish-black upon the addition of ferric chloride T.S.

Place 0.1 Gm. of powdered Uva Ursi on a watch crystal and cover with another watch crystal and gently heat the powder; a crystalline sublimate forms, consisting of long rods and feather-like aggregates which polarize light with a brilliant play of colors.

Macerate 1 Gm. of powdered Uva Ursi with 10 mils of boiling water, shake the mixture occasionally until cold and then filter it; the filtrate yields a grayish-purple precipitate upon the addition of a few drops of ferrous sulphate T.S.

Preparation—Fluidextractum Uvæ Ursi.

AVERAGE DOSE—Metric, 2 Gm.—Apothecaries, 30 grains.

VALERIANA

Valerian

Valer.

The dried rhizome and roots of *Valeriana officinalis* Linné (Fam. *Valerianaceæ*).

Rhizome upright, from 2 to 4 cm. in length and from 1 to 2 cm. in diameter, usually cut longitudinally into 2 to 4 pieces; externally yellowish-brown or dark brown, upper portion with stem-bases and frequently with a short horizontal branch or stolon, and from the outer surface arise numerous, slender, brittle roots; fracture of rhizome short and horny, internally light brown, with a thick bark and narrow central cylinder; odor pronounced, of valeric acid, becoming stronger upon aging; taste sweetish, camphoraceous and somewhat bitter.

Under the microscope, transverse sections of the root of Valerian show a single epidermal layer of papillose cells, some being modified to root hairs; a hypodermal layer containing some secretion cells with suberized walls, and in which are usually numerous small, oily globules and occasionally small prismatic crystals; cortical parenchyma, the cells filled with starch, some of the cells near the hypodermis containing a few oil globules; an endodermis of thin-walled cells enclosing a central cylinder with usually 3 to 5 fibro-vascular bundles; tracheæ with simple and bordered pores. Older roots show a large pith of starch-bearing parenchyma, a secondary thickening in the fibro-vascular bundles and a periderm of a few layers of cells.

Sections of the rhizome show a thin periderm, a cortical parenchyma with scattered fibro-vascular bundles, a layer of altered cells of the endodermis, numerous, more or less twisted, collateral fibro-vascular bundles and a large pith.

The powder is light brown to grayish-brown; under the microscope it exhibits numerous starch grains, from 0.003 to 0.02 mm. in diameter, spherical, plano-convex, polygonal, 2- to 4-compound and each usually with a central cleft; tracheal fragments, the walls having simple and bordered pores or scalariform and reticulate thickenings, accompanied by narrow sclerenchymatous fibers, the walls being thin, porous, and strongly lignified; occasional fragments of epidermis with root hairs, and fragments of cork.

Valerian yields not more than 20 per cent. of ash.

Preparations—Tinctura Valerianæ   Tinctura Valerianæ Ammoniata.

AVERAGE DOSE—Metric, 2 Gm.—Apothecaries, 30 grains.

VANILLINUM

Vanillin

Vanillin.

Methylprotocatechuic aldehyde [$C_8H_8O_3$ or $C_6H_3.OH.OCH_3.COH$ 4:3:1 = 152.06] occurring naturally in vanilla, or prepared synthetically. Preserve it in well-closed containers, protected from light.

Vanillin occurs in fine, white, or only very slightly yellowish, crystalline needles, having the odor and taste of vanilla.

One Gm. of Vanillin dissolves in 100 mils of water at 25° C.; also in 16 mils of water at 80° C.; freely soluble in alcohol, glycerin, chloroform, or ether.

Its aqueous solution is acid to litmus and is optically inactive.

It melts between 80° and 82° C.

It is easily dissolved by aqueous solutions of the alkali hydroxides, and from the combinations thus formed it is precipitated at once by the addition of acids.

An aqueous solution of Vanillin gives a blue color with ferric chloride T.S.; if the mixture is boiled, the blue color changes to brown, and on cooling a white, or nearly white, precipitate of dihydrodivanillin separates.

Vanillin is extracted completely from its solution in ether by shaking with a saturated, aqueous solution of sodium bisulphite, from which it is precipitated by the addition of sulphuric acid.

A cold aqueous solution of Vanillin gives, on the addition of lead acetate T.S., a white precipitate of a lead compound of vanillin, soluble in hot water.

Incinerate about 2 Gm. of Vanillin; not more than 0.05 per cent. of ash remains.

Warm about 0.1 Gm. of Vanillin with a concentrated alcoholic solution of sodium hydroxide, add a drop of chloroform and again warm; the odor of phenylisocyanide is not perceptible (*acetanilid*).

AVERAGE DOSE—Metric, 0.03 Gm.—Apothecaries, ½ grain.

VERATRINA

Veratrine

Veratrin.—Veratria

A mixture of alkaloids obtained from the seed of *Asagræa officinalis* (Chamisso and Schlechtendal) Lindley (Fam. *Liliaceæ*). Preserve it in well-closed containers, protected from light.

Veratrine is a white, or grayish-white, amorphous powder, odorless, but causing intense irritation and sneezing when even a minute quantity reaches the nasal mucous membrane. *Great caution must be used in tasting it.* It is slightly hygroscopic.

One Gm. of Veratrine dissolves in 1760 mils of water, 2.8 mils of alcohol, 0.7 mil of chloroform, and in 4.2 mils of ether at 25° C.; also in 1345 mils of water at 80° C.; insoluble in petroleum benzin.

Its alcoholic solution is alkaline to moistened litmus paper.

Triturate about 0.05 Gm. of Veratrine with 2 mils of sulphuric acid in a glass mortar; the yellow or orange-red solution exhibits by reflected light a greenish fluorescence, which becomes more intense upon the addition of an equal volume of sulphuric acid. Upon standing, the solution gradually assumes a deep red color.

Sulphuric acid, when heated with Veratrine, gives a cherry-red color. Sulphuric acid added to a mixture of one part of Veratrine and six parts of sugar produces a green color which changes to blue, and finally the mixture becomes colorless.

No weighable ash remains on incinerating 0.1 Gm. of Veratrine.

An alcoholic solution of Veratrine (1 in 20) remains clear after the addition of platinic chloride T.S. (*various foreign alkaloids*).

VERATRUM VIRIDE

Veratrum Viride

Verat. Vir.—Green Hellebore American Hellebore

The dried rhizome and roots of *Veratrum viride* Aiton (Fam. *Liliaceæ*), without the presence or admixture of more than 5 per cent. of stems or other foreign matter.

Rhizome upright, obconical, usually cut longitudinally into 2 to 4 pieces, from 2 to 7 cm. in length and from 1.5 to 3 cm. in diameter, externally light brown to dark brown or brownish-black, frequently bearing at the summit numerous, closely arranged, thin leaf-bases, otherwise rough and wrinkled, somewhat annulate from scars of bud-scales and bearing in the outer portion numerous roots, the lower part more or less decayed; fracture hard and horny; internally yellowish or grayish-white, marked with numerous, irregular fibrovascular bundles; inodorous but sternutatory; taste bitter and acrid.

Roots nearly cylindrical, from 3 to 8 cm. in length and from 1 to 3 mm. in diameter, externally light brown to yellowish-brown, deeply transversely wrinkled; fracture short, bark whitish, very thick, enclosing a porous central cylinder.

The powder is grayish-brown to dark brown, strongly sternutatory; under the microscope it exhibits numerous starch grains from 0.003 to 0.02 mm. in diameter, spherical or ellipsoidal, single or 2- to 3-compound, the individual grains being often swollen or otherwise more or less altered; calcium oxalate in raphides, from 0.015 to 0.15 mm. in length; fragments with tracheæ, the walls being more or less strongly lignified and marked with scalariform or reticulate thickenings, frequently containing a lemon-yellow substance and associated with narrow, slightly lignified, porous, sclerenchymatous fibers; reddish-brown or brownish-black cork fragments occasional.

Preparations—Fluidextractum Veratri Viridis Tinctura Veratri Viridis.

AVERAGE DOSE—Metric, 0.06 Gm.—Apothecaries, 1 grain.

VIBURNUM PRUNIFOLIUM

Viburnum Prunifolium

Viburn. Prun.—Black Haw Viburnum

The dried bark of *Viburnum prunifolium* Linné or of *Viburnum Lentago* Linné (Fam. *Caprifoliaceæ*), without the presence or admixture of more than 5 per cent. of wood or other foreign matter.

In irregular, transversely curved or quilled pieces, from 1.5 to 6 cm. in length, and from 0.5 to 1.5 mm. in thickness; outer surface grayish-brown, or, where the outer cork has scaled off, brownish-red, longitudinally wrinkled; inner surface reddish-brown, longitudinally striated; fracture short but uneven, showing in bark which is young or of medium thickness, a dark brown cork, a brownish-red outer cortex, and a whitish inner cortex in which are numerous light yellow groups of sclerenchymatous tissues; odor slight; taste distinctly bitter and somewhat astringent.

The powder is dark brown; under the microscope it exhibits numerous large stone cells, which are often elongated, thick-walled and strongly lignified; bast-fibers few, crystals of calcium oxalate from 0.015 to 0.035 mm. in diameter, occurring mostly in rosette aggregates, occasionally in crystal fibers; monoclinic prisms of calcium oxalate few.

Preparations—Extractum Viburni Prunifolii Fluidextractum Viburni Prunifolii.

AVERAGE DOSE—Metric, 2 Gm.—Apothecaries, 30 grains.

VIRUS VACCINICUM

Vaccine Virus

Virus Vaccin.—Glycerinated Vaccine Virus Smallpox Vaccine Jennerian Vaccine

The pustules of vaccinia or cowpox from healthy vaccinated animals of the bovine species, removed and prepared under aseptic conditions.

The vaccine pulp should be thoroughly rubbed up in a mortar or passed through a special grinder, strained to remove coarse particles, and made into a smooth emulsion with a glycerin solution. Vaccine Virus gradually loses in potency, the loss being more rapid at high than at low temperatures. Preserve it at a temperature between 4.5° and 15° C., protected from light.

Only such Vaccine Virus may be sold as has been prepared in establishments licensed by the Secretary of the Treasury of the United States.

The law and the regulations demand that the following requirements be observed: No Vaccine shall be used from any animal having a communicable disease, or suspected of having a communicable disease, other than vaccinia; animals used for propagating Vaccine Virus must be under daily veterinary examination for a period of not less than seven days before vaccination, and as soon as the vaccine pulp is removed a necropsy shall be made on each animal and permanent records kept. Each lot of Vaccine Virus shall be examined to determine its freedom from pathogenic micro-organisms and a special examination must be made of each lot to determine the absence of tetanus spores or toxin, and permanent records must be kept of these examinations. The Virus must be marketed in sterile containers that comply with the requirements of the law and the regulations established by the United States Public Health Service.

Each package of Vaccine Virus shall bear upon the label the name, address, and license number of the manufacturer and the date beyond which the contents cannot be expected to yield their specific results. The label should also contain the laboratory number of the Virus.

XANTHOXYLUM

Xanthoxylum

Xanthox.—Prickly Ash Bark

The dried bark of *Xanthoxylum americanum* Miller, known in commerce as Northern Prickly Ash Bark, or *Xanthoxylum Clava-Herculis* Linné, known in commerce as Southern Prickly Ash Bark (Fam. *Rutaceæ*).

Northern Prickly Ash Bark—In transversely curved fragments or quills, from 2 to 15 cm. in length; bark from 0.5 to 2 mm. in thickness; outer surface light gray to brownish-gray with grayish patches of foliaceous lichens bearing numerous small black apothecia; longitudinally wrinkled and with numerous whitish lenticels; the cork occasionally abraded, showing the yellowish or orange inner bark; inner surface yellowish-white, finely longitudinally striate and usually with numerous, bright, shining crystals; fracture short, uneven; odor slight; taste bitter, acrid, becoming pungent.

Under the microscope, transverse sections of Northern Prickly Ash Bark show an outer corky layer consisting of from 4 to 20 rows of cells, the tangential walls being more or less thickened and lignified; a wide strata of collenchyma inside of the cork cambium composed of from 8 to 10 rows of tangentially elongated cells, with very thick walls and containing plastids; a more or less indistinct row of endodermal cells beneath which occur small groups of primary bast-fibers; the inner bark consists of numerous parenchyma cells among which are included large oil-secretion reservoirs, separated by medullary rays which are mostly one cell in width; the parenchyma cells as well as the oil-secretion reservoirs contain numerous colorless oily globules. Scrapings from either the inner or outer surface show numerous rod-shape crystals and flat prisms, from 0.015 to 0.25 mm. in length, which polarize light with a display of bright colors.

Southern Prickly Ash Bark—In transversely curved or irregular, oblong, flattened pieces, or in quills from 2 to 40 cm. in length, bark from 1 to 4 mm. in thickness; outer surface light gray to brownish-gray, marked by numerous large, barnacle-shaped projections of cork, from 0.5 to 3.5 cm. in thickness, otherwise with numerous grayish patches of foliaceous lichens, bearing blackish apothecia, and numerous, elliptical lenticels; inner surface light yellowish-brown to olive brown, obscurely longitudinally striate and free from crystals; odor and taste as in Northern Prickly Ash Bark.

Under the microscope, transverse sections of Southern Prickly Ash Bark show a strong development of lignified cork occurring in the form of rings, the successive layers being separated by several rows of narrow tabular cells strongly thickened on the tangential walls; beneath the cork cambium occurs a thin layer of collenchyma followed by the outer tissues of the primary cortex and consisting of small groups of rather large stone cells and occasional, scattered groups of bast-fibers and parenchyma; the inner bark consists of parenchyma, a more or less indistinct leptome or sieve tissue among which are numerous, large, light yellowish oil-secretion reservoirs, medullary rays from 1 to 2 cells in width and occasional groups of stone cells and bast-fibers; starch grains numerous, nearly spherical, from 0.002 to 0.01 mm. in diameter, and occurring in the parenchyma cells and medullary rays; calcium oxalate chiefly in monoclinic prisms from 0.01 to 0.025 mm. in diameter, occurring in crystal fibers and in parenchyma cells of the primary cortex.

Powdered Xanthoxylum is light grayish-brown, under the microscope it shows mostly irregular fragments of cork cells, nearly colorless and strongly lignified, fragments of parenchyma containing either small starch grains, oily globules or monoclinic prisms of calcium oxalate; stone cells in small groups with thick, colorless walls and containing frequently a reddish-brown substance; bast-fibers few and non-lignified. In the Northern Prickly Ash, the stone cells are usually absent, and the calcium oxalate crystals and the fragments of cork are relatively few.

Preparation—Fluidextractum Xanthoxyli.

AVERAGE DOSE—Metric, 2 Gm.—Apothecaries, 30 grains.

ZINCI ACETAS

Zinc Acetate

Zinc. Acet.

It contains not less than 83.16 per cent. nor more than 87.32 per cent. of anhydrous zinc acetate, corresponding to not less than 99.5 per cent. of the crystallized salt [$Zn(C_2H_3O_2)_2+2H_2O=219.45$]. Preserve it in well-closed containers.

Zinc Acetate occurs as soft, white, six-sided, monoclinic plates, of a pearly luster, having a faintly acetous odor, and, in dilute solutions, an astringent, metallic taste. When exposed to the air, the salt gradually effloresces and loses some of its acid.

One Gm. of Zinc Acetate dissolves in 2.3 mils of water and in 30 mils of alcohol at 25° C.; also in 1.6 mils of boiling water and about 1 mil of boiling alcohol.

Its aqueous solution is neutral or slightly acid to litmus.

When heated, the salt is partially fused, losing water and acid. At a higher temperature it is decomposed, with evolution of inflammable and empyreumatic vapors, and leaving a residue consisting chiefly of zinc oxide.

An aqueous solution of the salt (1 in 20) yields a white, gelatinous precipitate with potassium ferrocyanide T.S. and a white precipitate with ammonium sulphide T.S.

Add 0.1 Gm. of the salt to 1 mil of sulphuric acid and 1 mil of alcohol and warm the mixture; ethyl acetate is formed, recognizable by its odor.

Ammonium carbonate T.S., when added in small portions to an aqueous solution of the salt (1 in 20), produces at first a white precipitate, which redissolves completely upon the addition of an excess of the reagent.

Ten mils of an aqueous solution of the salt (1 in 50), to which 1 mil of hydrochloric acid has been added, does not respond to the Test for heavy metals (see Part II, Test No. 3).

An aqueous solution of the salt meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Assay—Dissolve about 1 Gm. of Zinc Acetate, accurately weighed, in 100 mils of distilled water, render the solution slightly alkaline with ammonia water and warm it to 80° C. Completely precipitate the zinc as zinc sulphide by the addition of ammonium sulphide T.S. and warm the liquid on a water bath until the precipitate settles. Collect the latter on a filter, wash it with distilled water containing a few drops of ammonium sulphide T.S., then dissolve it in hot, dilute nitric acid (1 in 3), evaporate the solution to dryness in a tared platinum dish, ignite the residue and weigh it as zinc oxide. The amount of zinc oxide obtained corresponds to not less than 83.16 per cent. nor more than 87.32 per cent. of $Zn(C_2H_3O_2)_2$.

Each gramme of Zinc Acetate corresponds to not less than 0.369 Gm. nor more than 0.387 Gm. of zinc oxide.

Zinc Acetate may also be assayed by the Electrolytic method (see Part II, Test No. 4).

Average dose—Metric, 0.125 Gm.—Apothecaries, 2 grains.

ZINCI CARBONAS PRÆCIPITATUS

Precipitated Zinc Carbonate

Zinc. Carb. Præc.

Precipitated Zinc Carbonate is of somewhat variable chemical composition, corresponding to not less than 68 per cent. of ZnO (81.37).

Precipitated Zinc Carbonate is an impalpable, white powder without odor or taste. It is permanent in the air.

Precipitated Zinc Carbonate is insoluble in water or in alcohol; completely dissolved by diluted acids with copious effervescence; soluble in ammonia water and in ammonium carbonate T.S.

When strongly heated, the salt loses water and carbon dioxide, and leaves a residue, which is yellow while hot, but becomes white on cooling.

For making the following tests for identity, make a solution by adding 10 mils of diluted sulphuric acid and 10 mils of distilled water to 1.5 Gm. of Precipitated Zinc Carbonate, and, after effervescence has ceased, remove the undissolved excess by filtration.

In portions of this solution a white gelatinous precipitate is produced by potassium ferrocyanide T.S., and a white precipitate by ammonium sulphide T.S.

Another portion of this solution yields with ammonium carbonate T.S. a white precipitate, which redissolves completely in an excess of the reagent.

Ten mils of a solution of the salt (1 in 50) made with the aid of a slight excess of hydrochloric acid does not respond to the Test for heavy metals (see Part II, Test No. 3).

Mix 1 Gm. of the salt in a flask with 10 mils of boiling distilled water and add 2 drops of phenolphthalein T.S.; not more than 1 mil of tenth-normal hydrochloric acid V.S. is required to discharge any red color that may be produced (*alkali*).

Assay—Digest about 2 Gm. of Precipitated Zinc Carbonate, accurately weighed, with 50 mils of normal sulphuric acid V.S. until solution is complete; then titrate the excess of sulphuric acid with normal potassium hydroxide V.S., using methyl orange T.S. as indicator. It shows not less than 68 per cent. of ZnO.

Each mil of normal sulphuric acid V.S. used corresponds to 0.040685 Gm. of ZnO. Each gramme of Precipitated Zinc Carbonate corresponds to not less than 16.8 mils of normal sulphuric acid V.S.

ZINCI CHLORIDUM

Zinc Chloride

Zinc. Chlor.

It contains not less than 95 per cent. of $ZnCl_2$ (136.29). Preserve it in small, glass-stoppered bottles.

Zinc Chloride occurs as a white, or nearly white, granular powder, or in porcelain-like masses, or moulded into pencils; odorless; *it is so intensely caustic as to make tasting dangerous*, unless the salt is dissolved in a large quantity of water. It is very deliquescent.

One Gm. of Zinc Chloride dissolves in 0.25 mil of water, and in about 1.3 mils of alcohol at 25° C.; freely soluble in glycerin.

An aqueous solution of the salt (1 in 10) is acid to litmus.

When heated to 115° C., Zinc Chloride fuses to a clear liquid. At a higher temperature it is partly volatilized in dense, white fumes, and partly decomposed, leaving a residue of zinc oxide.

An aqueous solution of the salt (1 in 20) yields a white, gelatinous precipitate, with potassium ferrocyanide T.S. and a white precipitate with ammonium sulphide T.S.

With silver nitrate T.S. an aqueous solution of the salt (1 in 20) yields a white, curdy precipitate insoluble in nitric acid but readily soluble in ammonia water.

Mix an aqueous solution of the salt (1 in 20) with an equal volume of alcohol; a single drop of hydrochloric acid is sufficient to render 10 mils of the mixture perfectly clear (*oxychloride*).

Completely precipitate the zinc from a solution of 1 Gm. of the salt in 50 mils of distilled water, by means of ammonium sulphide, filter, evaporate the filtrate, and gently ignite; not more than 0.004 Gm. of residue remains.

Ten mils of an aqueous solution of the salt (1 in 50) to which 1 mil of diluted hydrochloric acid has been added does not respond to the Test for heavy metals (see Part II, Test No. 3).

Add ammonium carbonate T.S., in small portions, to an aqueous solution of Zinc Chloride (1 in 20); the precipitate produced is white, and redissolves completely in an excess of the reagent.

Add sufficient potassium hydroxide T.S. to 5 mils of an aqueous solution of the salt (1 in 10) to redissolve the precipitate which first forms, and then warm the solution; the odor of ammonia is not perceptible (*ammonium salts*).

Ten mils of an aqueous solution of the salt (1 in 20), acidulated with 1 mil of hydrochloric acid, is not rendered more than slightly turbid by the addition of 1 mil of barium chloride T.S. (*sulphate*).

Assay—Proceed as directed under the Assay for chlorides (see Part II, Test No. 5), using about 0.3 Gm. of Zinc Chloride, accurately weighed, in a stoppered weighing-bottle. It shows not less than 95 per cent. of $ZnCl_2$.

Each mil of tenth-normal silver nitrate V.S. used corresponds to 0.0068145 Gm. of $ZnCl_2$. Each gramme of Zinc Chloride corresponds to not less than 139.4 mils of tenth-normal silver nitrate V.S.

ZINCI OXIDUM

Zinc Oxide

Zinc. Oxid.

It contains, when freshly ignited, not less than 99 per cent. of ZnO (81.37).

Zinc Oxide is a very fine, amorphous, white or yellowish-white powder, free from gritty particles, without odor or taste; it gradually absorbs carbon dioxide from the air.

Zinc Oxide is insoluble in water or in alcohol; it dissolves without effervescence in dilute acids, also in ammonia water and in ammonium carbonate T.S.

When strongly heated, it assumes a yellow color which disappears on cooling.

For making the following tests for identity, digest 1.3 Gm. of Zinc Oxide, with occasional agitation, in a mixture of 10 mils of diluted hydrochloric acid and 10 mils of distilled water until the solution is saturated, then remove the undissolved Zinc Oxide by filtration.

In portions of this filtrate a white, gelatinous precipitate is produced by potassium ferrocyanide T.S., and a white precipitate by ammonium sulphide T.S.

Ten mils of a solution of Zinc Oxide (1 in 50), made with the aid of a slight excess of hydrochloric acid, does not respond to the Test for heavy metals (see Part II, Test No. 3).

Mix 1 Gm. of Zinc Oxide in a flask with 10 mils of boiling distilled water and add 2 drops of phenolphthalein T.S.; not more than 1 mil of tenth-normal hydrochloric acid V.S. is required to discharge any red color that may be produced (*alkali*).

Assay—Digest about 1.5 Gm. of freshly ignited Zinc Oxide, accurately weighed, with 50 mils of normal sulphuric acid V.S. until solution is complete. Then titrate the excess of sulphuric acid with normal potassium hydroxide V.S., using methyl orange T.S. as indicator. It shows not less than 99 per cent. of ZnO.

Each mil of normal sulphuric acid V.S. used corresponds to 0.040685 Gm. of ZnO. Each gramme of freshly ignited Zinc Oxide corresponds to not less than 24.3 mils of normal sulphuric acid V.S.

Preparation—Unguentum Zinci Oxidi.

ZINCI PHENOLSULPHONAS

Zinc Phenolsulphonate

Zinc. Phenolsulph.—Zinc Sulphocarbolate

It contains not less than 73.7 per cent. nor more than 77.4 per cent. of anhydrous zinc phenolsulphonate, corresponding to not less than 99.5 per cent. of the crystallized salt [$(C_6H_5O.SO_3)_2Zn + 8H_2O = 555.72$]. Preserve it in small, well-closed containers.

Zinc Phenolsulphonate occurs as colorless, transparent, rhombic prisms or tabular crystals or in granular form; odorless, and having an astringent, metallic taste. When exposed to the air the salt effloresces, and upon exposure to light and air may become slightly pink.

One Gm. of Zinc Phenolsulphonate dissolves in 1.6 mils of water, and in 1.8 mils of alcohol at 25° C.; also in 0.4 mil of boiling water.

Its aqueous solution (1 in 10) is acid to litmus.

When heated to 125° C., the salt loses all of its water of crystallization. At a higher temperature it chars, emitting inflammable vapors having the odor of phenol, and finally leaves an incombustible residue.

An aqueous solution of the salt (1 in 20) yields a white, gelatinous precipitate with potassium ferrocyanide T.S., and a white precipitate with ammonium sulphide T.S.

Ammonium carbonate T.S., when added in small portions to an aqueous solution of the salt (1 in 20), produces a white precipitate which redissolves completely upon the addition of an excess of the reagent.

A dilute solution of the salt (1 in 100) is colored pale violet by ferric chloride T.S.

The addition of a few drops of barium chloride T.S. to 10 mils of an aqueous solution of the salt (1 in 20), previously acidulated with 3 drops of hydrochloric acid, produces not more than a slight turbidity (*sulphate*).

Ten mils of an aqueous solution of the salt (1 in 50), to which 1 mil of diluted hydrochloric acid has been added, does not respond to the Test for heavy metals (see Part II, Test No. 3).

An aqueous solution of the salt meets the requirements of the Test for arsenic (see Part II, Test No. 1).

Assay—Dissolve about 1 Gm. of Zinc Phenolsulphonate, accurately weighed, in 100 mils of distilled water and proceed as directed in the assay under *Zinci Acetas*. The amount of zinc oxide obtained corresponds to not less than 73.7 per cent. nor more than 77.4 per cent. of $Zn(C_6H_5O_4S_2)_2$.

Each gramme of Zinc Phenolsulphonate corresponds to not less than 0.146 Gm. nor more than 0.153 Gm. of ZnO.

Zinc Phenolsulphonate may also be assayed by the Electrolytic method (see Part II, Test No. 4).

AVERAGE DOSE—Metric, 0.125 Gm.—Apothecaries, 2 grains.

ZINCI STEARAS

Zinc Stearate

Zinc. Stear.

A compound of zinc with stearic acid and small, but variable proportions of palmitic acid, containing an amount of zinc corresponding to not less than 13 per cent. nor more than 15.5 per cent. of ZnO.

Zinc Stearate is a fine, white, bulky powder, tasteless and having a faint, characteristic odor.

Zinc Stearate is insoluble in water, alcohol or ether.

The salt is neutral to moistened litmus paper.

When heated, the salt fuses. At a higher temperature it is decomposed, giving off inflammable vapors and the odor of burning fat, and finally leaves a residue consisting chiefly of zinc oxide.

Heat 1 Gm. of Zinc Stearate with a mixture of 25 mils of distilled water and 5 mils of hydrochloric acid; stearic acid is liberated and floats as an oily layer on the surface of the liquid.

Boil 1 Gm. of Zinc Stearate with 25 mils of distilled water and 5 mils of hydrochloric acid, filter while hot and wash the filter with 25 mils of hot water. Render the filtrate alkaline with ammonia water, warm it to 80° C., and add ammonium sulphide T.S. in excess, filter, evaporate the filtrate to dryness, and ignite the residue. Dissolve this residue in 10 mils of hot distilled water, filter, again evaporate, ignite, and weigh; not more than 1 per cent. of residue remains (*alkalies and alkali earths*).

The insoluble residue of fatty acids obtained in the preceding test, when well washed, melts at a temperature not below 56° C.

Assay—Boil about 1 Gm. of Zinc Stearate, accurately weighed, with 50 mils of tenth-normal sulphuric acid V.S. for ten minutes and cool. Then titrate the excess of sulphuric acid with tenth-normal potassium hydroxide V.S., using methyl orange T.S. as indicator. It shows not less than 13 per cent. nor more than 15.5 per cent. of ZnO.

Each mil of tenth-normal sulphuric acid V.S. used corresponds to 0.0040685 Gm. of ZnO. Each gramme of Zinc Stearate corresponds to not less than 32 mils nor more than 38.1 mils of tenth-normal sulphuric acid V.S.

ZINCI SULPHAS

Zinc Sulphate

Zinc. Sulph.

It contains not less than 55.86 per cent. nor more than 58.65 per cent. of anhydrous zinc sulphate, corresponding to not less than 99.5 per cent. of the crystallized salt [$ZnSO_4+7H_2O=287.55$]. Preserve it in well-closed containers.

Zinc Sulphate occurs as colorless, transparent, rhombic crystals, or as a granular, crystalline powder, without odor, and having an astringent, metallic taste. It is efflorescent in dry air.

One Gm. of Zinc Sulphate dissolves in 0.6 mil of water, and in 2.5 mils of glycerin at 25° C.; insoluble in alcohol.

Its aqueous solution (1 in 10) is acid to litmus.

When rapidly heated, the salt melts. When strongly ignited it is partly decomposed, losing both water and sulphuric acid.

An aqueous solution of the salt (1 in 20) yields a white, gelatinous precipitate with potassium ferrocyanide T.S., and a white precipitate with ammonium sulphide T.S. and with barium chloride T.S.

An aqueous solution of the salt (1 in 10) yields with ammonium carbonate T.S. a white precipitate, which redissolves completely in an excess of the reagent.

Ten mils of an aqueous solution of Zinc Sulphate (1 in 50), after being acidulated with 1 mil of diluted hydrochloric acid, does not respond to the Test for heavy metals (see Part II, Test No. 3).

An aqueous solution of the salt meets the requirements of the Test for arsenic (see Part II, Test No. 1).

An aqueous solution of Zinc Sulphate (1 in 20) is not colored pink by methyl orange T.S. (*free acid*).

Add 2 drops of nitric acid to a solution of 1 Gm. of Zinc Sulphate in 20 mils of distilled water, follow with 0.2 mil of tenth-normal silver nitrate V.S. and filter the mixture. The subsequent addition of a few drops of tenth-normal silver nitrate V.S. to the filtrate produces no cloudiness or opalescence (*chloride*).

Dissolve 1 Gm. of Zinc Sulphate in 50 mils of distilled water, precipitate the zinc completely with ammonium sulphide T.S., filter, evaporate the filtrate to dryness, and ignite; not more than 0.5 per cent. of residue remains (*alkali and alkali earth salts*).

Assay—Dissolve about 1 Gm. of Zinc Sulphate, accurately weighed, in 100 mils of distilled water and estimate the salt as zinc oxide by the method given in the assay under *Zinci Acetas*. The salt yields an amount of zinc oxide corresponding to not less than 55.86 per cent. nor more than 58.65 per cent. of $ZnSO_4$.

Each gramme of Zinc Sulphate corresponds to not less than 0.2815 Gm. nor more than 0.2955 Gm. of ZnO.

Zinc Sulphate may also be assayed by the Electrolytic method (see Part II, Test No. 4).

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

ZINCI VALERAS

Zinc Valerate

Zinc. Valer.—Zinc Valerianate

It contains not less than 99 per cent. of the crystallized salt [$Zn(C_5H_9O_2)_2+2H_2O=303.55$]. Preserve it in small, well-closed containers.

Zinc Valerate occurs as white, pearly scales, or as a white powder having the odor of valeric acid, and a sweetish, astringent, and metallic taste. On exposure to the air, it slowly loses valeric acid and becomes partially insoluble in water.

One Gm. of Zinc Valerate dissolves in 70 mils of water at 25° C., usually leaving an insoluble residue of basic salt; soluble in 22 mils of alcohol at 25° C.

Its aqueous solution (1 in 100) is acid to litmus.

When gently heated, the salt melts. At a higher temperature it is decomposed, giving off inflammable vapors, and finally leaving a residue consisting chiefly of zinc oxide.

Dissolve 0.5 Gm. of Zinc Valerate in a mixture of 0.5 mil of hydrochloric acid and 9 mils of distilled water; the valeric (isovaleric) acid is liberated and floats as an oily layer on the surface of the liquid.

Filter the mixture just prepared through a small, wetted filter; the clear filtrate diluted with distilled water to 25 mils does not respond to the Test for heavy metals (see Part II, Test No. 3).

Heat 0.5 Gm. of Zinc Valerate with a mixture of 7.5 mils of distilled water and 5 mils of diluted sulphuric acid and filter; 5 mils of the filtrate meets the requirements for the Test for arsenic (see Part II, Test No. 1).

Zinc Valerate dissolves in ammonium carbonate T.S. without leaving a residue.

Triturate 0.5 Gm. of Zinc Valerate with 3 mils of distilled water and 0.2 mil of ferric chloride T.S., and filter; the filtrate does not show a red color (*acetate*).

Add a concentrated, aqueous solution of copper acetate to a concentrated aqueous solution of Zinc Valerate; the mixture remains perfectly clear (*butyrate*).

Assay—Dissolve about 1 Gm. of Zinc Valerate, accurately weighed, in 100 mils of distilled water, with the aid of a few drops of hydrochloric acid, if necessary, and estimate the zinc as zinc oxide by the method given in the assay under *Zinci Acetas*. The salt yields an amount of zinc oxide corresponding to not less than 99 per cent. of $Zn(C_5H_9O_2)_2+2H_2O$.

Each gramme of Zinc Valerate corresponds to not less than 0.265 Gm. of ZnO.

Zinc Valerate may also be assayed by the Electrolytic method (see Part II, Test No. 4).

AVERAGE DOSE—Metric, 0.125 Gm.—Apothecaries, 2 grains.

ZINCUM

Zinc

Zinc.

It contains not less than 99 per cent. of Zn (65.37).

Zinc is a bluish-white metal, showing a crystalline fracture. It occurs in the form of thin sheets, or in irregular, granulated pieces, or moulded into thin pencils, or in powder, and having a specific gravity ranging from 6.9 when it is cast to 7.2 after it is rolled.

It is dissolved by diluted sulphuric or hydrochloric acid with the evolution of hydrogen, usually leaving some insoluble residue.

When heated above 100° C. and not above 150° C., the metal becomes malleable and ductile; above 200° C., it becomes sufficiently brittle to be powdered in an iron mortar; at from 412° to 415° C. it melts, and at 940° C. it boils and may be readily distilled.

Add 1 Gm. of Zinc to 25 mils of diluted sulphuric acid; the liberated hydrogen does not have a disagreeable odor, nor does it color a strip of paper moistened with lead acetate T.S. (*sulphur*), or with silver nitrate T.S. (*arsenic, antimony, and phosphorus*). The filtered solution is colorless, and yields a white, gelatinous precipitate with potassium ferrocyanide T.S., and a white precipitate with ammonium sulphide T.S.

Assay—Dissolve about 1 Gm. of Zinc, accurately weighed, in a slight excess of hydrochloric acid and add sufficient distilled water to make 100 mils. Dilute 10 mils of the clear solution with distilled water to make 100 mils, render it slightly alkaline with ammonia water and subsequently treat it as directed in the assay for *Zinci Acetas* for the determination of zinc oxide. The metal yields an amount of zinc oxide corresponding to not less than 99 per cent. of Zn.

Each gramme of Zinc corresponds to not less than 1.232 Gm. of ZnO.

Zinc may also be assayed by the Electrolytic method (see Part II, Test No. 4).

ZINGIBER

Ginger

Zingib.

The dried rhizomes of *Zingiber officinale* Roscoe (Fam. *Zingiberaceæ*), the outer cortical layers of which are often either partially or completely removed. Preserve it in tightly-closed containers, adding a few drops of chloroform or carbon tetrachloride, from time to time, to prevent attack by insects.

Jamaica Ginger—Rhizomes free from the outer corky layers, in horizontal, laterally compressed, irregularly branched pieces, from 4 to 16 cm. in length; and from 4 to 20 mm. in thickness; externally light brown, longitudinally striate, ends of the branches with depressed stem-scars; fracture short-fibrous, mealy and resinous; internally yellowish to light brown, cortex thin, endodermis a thin yellow layer enclosing a large central cylinder with numerous groups of fibro-vascular bundles and yellowish oil cells; odor agreeably aromatic; taste aromatic and pungent.

African Ginger—Rhizomes with cork partly removed on the flattened sides, the patches without cork smooth and of a light brown color, the portions with cork longitudinally or reticulately wrinkled and grayish-brown; fracture short or short-fibrous, internally lemon-yellow or dark bluish with yellowish oil-secretion cells and light yellow to reddish-brown resin cells; odor strongly aromatic; taste intensely pungent.

Calcutta Ginger—Rhizomes resembling the African Ginger, the branches or "fingers" being somewhat larger, and with a considerable proportion of shriveled pieces, externally grayish-brown or grayish-blue; fracture short and mealy, or horny; internally light yellow or light brownish-yellow with numerous yellowish oil cells and yellowish-brown resin cells; odor aromatic; taste starchy and strongly pungent.

Calicut Ginger—Rhizomes resembling African Ginger, more of the periderm being usually removed; externally more or less uniformly light brown; fracture short or short-fibrous, and mealy; internally light-yellow or brownish-yellow with numerous yellowish oil and resin cells; odor aromatic; taste very pungent.

Cochin Ginger—Rhizomes with most of the corky layer removed on the flattened sides; externally light brown to grayish-yellow, fracture short and mealy; internally yellowish-white with numerous yellowish oil cells and brownish-red or blackish resin cells; odor aromatic; taste pungent but not so persistent as in the African variety.

Japanese Ginger—Rhizome somewhat resembling Cochin Ginger but usually with a thin coating of lime; externally nearly smooth or slightly wrinkled and of a whitish color; fracture short and very mealy; internally varying from a yellowish-white to light brown and with numerous brownish-red resin cells; odor aromatic; taste pungent.

Powdered Ginger is light yellow, or light brown to dark brown; under the microscope it exhibits numerous starch grains varying greatly in form and size in the different varieties, being nearly spherical, ovoid, ellipsoidal or pear-shaped and frequently with a characteristic beak, usually from 0.005 to 0.04 mm., occasionally from 0.045 to 0.06 mm. in the long diameter; sclerenchymatous fibers long, thin-walled, non-lignified, with oblique pores and distinctly undulate on one side; oil-secretion cells with suberized walls and containing a light yellowish or yellowish-brown, oily substance; cork cells absent in the Jamaica variety.

Introduce 4 Gm. of ground Ginger into a 200 mil flask, fill to the mark with distilled water, and agitate at half-hour intervals during eight hours. Then allow the mixture to stand for sixteen hours, and filter. Evaporate 50 mils of the filtrate, representing 1 Gm. of the drug, on a water bath, dry to constant weight at 100° C., and weigh; it yields not less than 8 per cent. of residue.

Ginger yields not less than 2 per cent. of a non-volatile extract soluble in ether and not less than 4 per cent. of an extract soluble in alcohol.

Ginger yields not more than 8 per cent. of ash.

Preparations—Fluidextractum Aromaticum (from Aromatic Powder) Fluidextractum Zingiberis Oleoresina Zingiberis Pulvis Aromaticum Pulvis Rhei Compositus Syrupus Zingiberis (from Fluidextract) Tinctura Zingiberis.

AVERAGE DOSE—Metric, 1 Gm.—Apothecaries, 15 grains.

PART II

PART II

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Atomic Weights

Adopted by the International Committee on Atomic Weights (1915)

Oxygen = 16

Name.	Symbol.	Atomic Weight.
Aluminum	Al	27.1
Antimony	Sb	120.2
Argon	A	39.88
Arsenic	As	74.96
Barium	Ba	137.37
Bismuth	Bi	208.0
Boron	B	11.0
Bromine	Br	79.92
Cadmium	Cd	112.40
Cæsium	Cs	132.81
Calcium	Ca	40.07
Carbon	C	12.00
Cerium	Ce	140.25
Chlorine	Cl	35.46
Chromium	Cr	52.0
Cobalt	Co	58.97
Columbium	Cb	93.5
Copper	Cu	63.57
Dysprosium	Dy	162.5
Erbium	Er	167.7
Europium	Eu	152.0
Fluorine	F	19.0
Gadolinium	Gd	157.3
Gallium	Ga	69.9
Germanium	Ge	72.5
Glucinum	Gl	9.1
Gold	Au	197.2
Helium	He	3.99
Holmium	Ho	163.5
Hydrogen	H	1.008
Indium	In	114.8
Iodine	I	126.92
Iridium	Ir	193.1
Iron	Fe	55.84
Krypton	Kr	82.92
Lanthanum	La	139.0
Lead	Pb	207.10
Lithium	Li	6.94
Lutecium	Lu	174.0
Magnesium	Mg	24.32
Manganese	Mn	54.93
Mercury	Hg	200.6
Molybdenum	Mo	96.0
Neodymium	Nd	144.3
Neon	Ne	20.2
Nickel	Ni	58.68
Niton (radium emanation)	Nt	222.4
Nitrogen	N	14.01
Osmium	Os	190.9
Oxygen	O	16.00
Palladium	Pd	106.7
Phosphorus	P	31.04
Platinum	Pt	195.2
Potassium	K	39.10
Praseodymium	Pr	140.6
Radium	Ra	226.4
Rhodium	Rh	102.9
Rubidium	Rb	85.45
Ruthenium	Ru	101.7
Samarium	Sa	150.4
Scandium	Sc	44.1
Selenium	Se	79.2
Silicon	Si	28.3
Silver	Ag	107.88
Sodium	Na	23.00
Strontium	Sr	87.63
Sulphur	S	32.07
Tantalum	Ta	181.5
Tellurium	Te	127.5
Terbium	Tb	159.2
Thallium	Tl	204.0
Thorium	Th	232.4
Thulium	Tm	168.5
Tin	Sn	119.0
Titanium	Ti	48.1
Tungsten	W	184.0
Uranium	U	238.5
Vanadium	V	51.0
Xenon	Xe	130.2
Ytterbium (Neoytterbium)	Yb	172.0
Yttrium	Yt	89.0
Zinc	Zn	65.37
Zirconium	Zr	90.6

Elements and Pharmacopœial Chemicals

With their Atomic or Molecular Weights and a Table of Multiples

This list contains the official chemicals and reagents of a definite composition, and also some that are not official, but which are likely to be required in stoichiometrical calculations. The figures in the list given below are based upon the Table of International Atomic Weights (1915), with Oxygen taken as 16. The elementary substances are also given in a separate list (see page 503). In the case of a few salts, for which this Pharmacopœia has given no formula on account of the difficulty of securing an absolutely uniform composition, the theoretical formula has been inserted merely for information. In the case of many hydrated compounds the formula and molecular weight of the corresponding anhydrous salt have also been given, to save time in making calculations.

		O = 16
Acetaldehyde (Acetic Aldehyde)	CH_3CHO	44.03
Acetanilid (Phenylacetamide)	C_8H_9ON	135.08
Acetic Anhydride	$(CH_3CO)_2O$	102.05
Acetone	C_3H_6O	58.05
Acetphenetidin (Acetparaphenetidin)	$C_{10}H_{13}O_2N$	179.11
Acid, Acetic	$HC_2H_3O_2$	60.03
“ “ Anhydride	$(CH_3CO)_2O$	102.05
“ Acetylsalicylic	$HC_7H_4O_2C_2H_3O_2$	180.06
“ Arsenic	$H_3AsO_4+\frac{1}{2}H_2O$	150.99
“ Aurochloric (Chlorauric)	$HAuCl_4+4H_2O$	412.11
“ Benzoic	$HC_7H_5O_2$	122.05
“ Boric	H_3BO_3	62.02
“ Bromauric (Aurobromhydric)	$HAuBr_4+5H_2O$	607.97
“ Camphoric	$H_2C_{10}H_{14}O_4$	200.13
“ Carbolic (see Phenol)		
“ Chlorauric (Aurochloric)	$HAuCl_4+4H_2O$	412.11
“ Chloroplatinic	$H_2PtCl_6+6H_2O$	518.07
“ Cinnamic (Cinnamylic)	$HC_9H_7O_2$	148.06
“ Citric	$H_3C_6H_5O_7+H_2O$	210.08
“ “ Anhydrous	$H_3C_6H_5O_7$	192.06
“ Diethyl-barbituric	$C_8H_{12}O_3N_2$	184.12
“ Formic	$HCHO_2$	46.02
“ Gallic	$HC_7H_5O_5+H_2O$	188.06
“ “ Anhydrous	$HC_7H_5O_5$	170.05
“ Glycerophosphoric	$H_2C_3H_5(OH)_2PO_4$	172.11
“ Hydriodic	HI	127.93
“ Hydrobromic	HBr	80.93
“ Hydrochloric	HCl	36.47
“ Hydrocyanic	HCN	27.02
“ Hydrofluoric	HF	20.01
“ Hydrosulphuric (Hydrogen Sulphide)	H_2S	34.09
“ Hypophosphorous	HPH_2O_2	66.06
“ Lactic	$HC_3H_5O_3$	90.05

		O = 16
Acid, Molybdic	H_2MoO_4	162.02
" Nitric	HNO_3	63.02
" Nitrous	HNO_2	47.02
" Oleic	$HC_{18}H_{33}O_2$	282.27
" Oxalic	$H_2C_2O_4+2H_2O$	126.05
" " Anhydrous	$H_2C_2O_4$	90.02
" Phenolsulphonic (Phenoldisulphonic)	$HC_6H_3(HSO_3)_2O$	254.19
" Phenylcinchoninic	$HC_{16}H_{10}O_2N$	249.10
" Phosphoric	H_3PO_4	98.06
" Phosphorous	H_3PO_3	82.06
" Picric (see Trinitrophenol)		
" Pyroboric (Tetraboric)	$H_2B_4O_7$	158.02
" Pyrogallic (see Pyrogallol)		
" Rosolic (see Methylaurin)		
" Salicylic	$HC_7H_5O_3$	138.05
" Stearic	$HC_{18}H_{35}O_2$	284.29
" Succinic	$H_2C_4H_4O_4$	118.05
" Sulphanilic	$HC_6H_4(NH_2)SO_3+2H_2O$	209.17
" " Anhydrous	$HC_6H_4(NH_2)SO_3$	173.14
" Sulphuric	H_2SO_4	98.09
" Sulphurous	H_2SO_3	82.09
" Tannic (variable)	$HC_{14}H_9O_9$	322.08
" Tartaric	$H_2C_4H_4O_6$	150.05
" Tetraboric (Pyroboric)	$H_2B_4O_7$	158.02
" Trichloracetic	$HC_2O_2Cl_3$	163.39
" Tungstic	H_2WO_4	250.02
" Valeric (Valerianic)	$HC_5H_9O_2$	102.08
Aconitine	$C_{34}H_{47}O_{11}N$	645.39
Alcohol, Amyl (Amyl Hydroxide)	$C_5H_{11}OH$	88.10
" Ethyl (Ethyl Hydroxide)	C_2H_5OH	46.05
" Methyl (Methyl Hydroxide)	CH_3OH	32.03
Aldehyde, Acetic (Acetaldehyde)	CH_3CHO	44.03
" Benzoic (Benzaldehyde)	C_7H_6O	106.05
" Cinnamic	C_8H_7CHO	132.06
" Formic (Formaldehyde)	CH_2O	30.02
Allyl-isothiocyanate	C_3H_5SCN	99.12
Allyl-sulphocarbamide (Thiosinamine)	$C_3H_5SCN_2H_3$	116.15
Alum (see Aluminum and Potassium Sulphate and Aluminum and Ammonium Sulphate)		
Aluminum	**Al**	**27.1**
Aluminum and Ammonium Sulphate (Alum)	$AlNH_4(SO_4)_2+12H_2O$	453.47
" " " " Anhydrous	$AlNH_4(SO_4)_2$	237.28
" " Potassium Sulphate (Alum)	$AlK(SO_4)_2+12H_2O$	474.53
" " " " Anhydrous	$AlK(SO_4)_2$	258.34
" Hydroxide	$Al(OH)_3$	78.12
" Oxide	Al_2O_3	102.20
" Silicate (Kaolin) (approximately)	$H_2Al_2(SiO_4)_2+H_2O$	258.83

		O = 16
Aluminum Sulphate	$Al_2(SO_4)_3+18H_2O$	666.70
“ “ Anhydrous	$Al_2(SO_4)_3$	342.41
Ammonia	NH_3	17.03
Ammonium Acetate	$NH_4C_2H_3O_2$	77.07
“ Arsenite (Metarsenite)	NH_4AsO_2	125.00
“ Benzoate	$NH_4C_7H_5O_2$	139.08
“ Bromide	NH_4Br	97.96
“ Carbamate	$NH_4NH_2CO_2$	78.07
“ Carbonate (Acid)	NH_4HCO_3	79.05
“ “ (Normal)	$(NH_4)_2CO_2$	96.08
“ “ (U.S.P.) (approximately)	$NH_4HCO_3NH_4NH_2CO_2$	157.12
“ Chloride	NH_4Cl	53.50
“ Chloroplatinate	$(NH_4)_2PtCl_6$	444.04
“ Citrate	$(NH_4)_3C_6H_5O_7$	243.17
“ Hydrogen Fluoride	NH_4FHF	57.05
“ Hydrogen Sulphide	NH_4HS	51.12
“ Hypophosphite	$NH_4PH_2O_2$	83.10
“ Iodide	NH_4I	144.96
“ Lactate	$NH_4C_3H_5O_3$	107.08
“ Molybdate	$(NH_4)_6Mo_7O_{24}+4H_2O$	1236.32
“ Nitrate	NH_4NO_3	80.05
“ Oxalate	$(NH_4)_2C_2O_4+H_2O$	142.10
“ “ Anhydrous	$(NH_4)_2C_2O_4$	124.08
“ Phosphate	$(NH_4)_2HPO_4$	132.13
“ Salicylate	$NH_4C_7H_5O_3$	155.08
“ and Sodium Phosphate	$NH_4NaHPO_4+4H_2O$	209.15
“ Sulphate	$(NH_4)_2SO_4$	132.15
“ Sulphide	$(NH_4)_2S$	68.15
“ Tartrate	$(NH_4)_2C_4H_4O_6$	184.12
“ Valerate (not U.S.P.)	$NH_4C_5H_9O_2$	119.11
“ Vanadate (Metavanadate)	NH_4VO_3	117.04
Amyl Nitrite	$C_5H_{11}NO_2$	117.10
Amylene Hydrate	$C_5H_{12}O$	88.10
Anethol	$C_{10}H_{12}O$	148.10
Aniline (Phenylamine)	$C_6H_5NH_2$	93.07
“ Sulphate	$(C_6H_5NH_2)_2H_2SO_4$	284.22
Antimony	**Sb**	**120.2**
Antimony and Potassium Tartrate	$K(SbO)C_4H_4O_6+\frac{1}{2}H_2O$	332.34
“ “ “ “ Anhydrous	$K(SbO)C_4H_4O_6$	323.33
Antimonic Sulphide	Sb_2S_5	400.75
Antimonous Oxide	Sb_2O_3	288.40
“ Sulphide	Sb_2S_3	336.61
Antipyrine	$C_{11}H_{12}ON_2$	188.12
Apomorphine Hydrochloride	$C_{17}H_{17}O_2NHCl+\frac{1}{2}H_2O$	312.62
Argon	**A**	**39.88**
Arsenic	**As**	**74.96**

		O = 16
Arsenic Sulphide	As_2S_5	310.27
" Trioxide (see Arsenous Oxide)	As_2O_3	197.92
Arsenous Iodide (Arsenic Triiodide)	AsI_3	455.72
" Oxide (Arsenic Trioxide)	As_2O_3	197.92
" Sulphide	As_2S_3	246.13
Aspidospermine	$C_{22}H_{30}O_2N_2$	354.26
Atropine	$C_{17}H_{23}O_3N$	289.19
" Sulphate	$(C_{17}H_{23}O_3N)_2H_2SO_4+H_2O$	694.49
Auric Chloride	$AuCl_3$	303.58
Barium	**Ba**	**137.37**
Barium Carbonate	$BaCO_3$	197.37
" Chloride	$BaCl_2+2H_2O$	244.32
" " Anhydrous	$BaCl_2$	208.29
" Chromate	$BaCrO_4$	253.37
" Dioxide	BaO_2	169.37
" Hydroxide	$Ba(OH)_2+8H_2O$	315.51
" Nitrate	$Ba(NO_3)_2$	261.39
" Sulphate	$BaSO_4$	233.44
" Sulphide	BaS	169.44
Benzaldehyde (Benzoic Aldehyde)	C_6H_5CHO	106.05
Benzene (Benzol)	C_6H_6	78.05
Benzosulphinide (Saccharin, Benzoyl-sulphonic-imide)	$C_7H_5O_3NS$	183.12
Benzoyl-acetyldioxide	$C_6H_5CO.C_2H_3O.O_2$	180.06
Betaeucaine Hydrochloride	$C_{15}H_{21}O_2NHCl$	283.65
Betanaphthol (Naphthol)	$C_{10}H_8O$	144.06
Bismuth	**Bi**	**208.0**
Bismuth Betanaphthol (approximately)	$(BiO)_2OHC_{10}H_7O$	608.06
" Citrate	$BiC_6H_5O_7$	397.04
" Nitrate (normal)	$Bi(NO_3)_3+5H_2O$	484.11
" Subcarbonate (approximately)	$[(BiO)_2CO_3]_2+H_2O$	1034.02
" Subgallate (approximately)	$Bi(OH)_2C_7H_5O_5$	411.06
" Subnitrate (approximately)	$Bi(OH)_2NO_3$	304.03
" Subsalicylate (approximately)	$Bi(OH)_2C_7H_5O_3$	379.06
" Sulphide	Bi_2S_3	512.21
" Trioxide	Bi_2O_3	464.00
Borneol	$C_{10}H_{17}OH$	154.14
Bornyl Acetate	$C_{10}H_{17}C_2H_3O_2$	196.16
Boron	**B**	**11.0**
Boron Trioxide	B_2O_3	70.0
Bromine	**Br**	**79.92**
Bromoform	$CHBr_3$	252.77
Brucine	$C_{23}H_{26}O_4N_2+4H_2O$	466.29
" Anhydrous	$C_{23}H_{26}O_4N_2$	394.23
Cadmium	**Cd**	**112.40**
Cadmium Chloride	$CdCl_2+2H_2O$	219.35
" " Anhydrous	$CdCl_2$	183.32

		O = 16
Cadmium Iodide	CdI_2	366.24
“ Sulphate	$3CdSO_4+8H_2O$	769.54
“ “ Anhydrous	$CdSO_4$	208.47
“ Sulphide	CdS	144.47
Caesium	**Cs**	**132.81**
Caffeine	$C_8H_{10}O_2N_4+H_2O$	212.14
“ Anhydrous	$C_8H_{10}O_2N_4$	194.12
“ Citrated	$C_8H_{10}O_2N_4C_6H_8O_7$	386.18
Calcium	**Ca**	**40.07**
Calcium Bromide	$CaBr_2+2H_2O$	235.94
“ “ Anhydrous	$CaBr_2$	199.91
“ Carbonate	$CaCO_3$	100.07
“ Chloride	$CaCl_2+2H_2O$	147.02
“ “ Anhydrous	$CaCl_2$	110.99
“ Fluoride	CaF_2	78.07
“ Glycerophosphate	$CaC_3H_7PO_6+H_2O$	228.18
“ “ Anhydrous	$CaC_3H_7PO_6$	210.17
“ Hydroxide	$Ca(OH)_2$	74.09
“ Hypophosphite	$Ca(PH_2O_2)_2$	170.18
“ Lactate	$Ca(C_3H_5O_3)_2+5H_2O$	308.23
“ “ Anhydrous	$Ca(C_3H_5O_3)_2$	218.15
“ Oxalate	$CaC_2O_4+H_2O$	146.09
“ Oxide (Lime)	CaO	56.07
“ Phosphate	$Ca_3(PO_4)_2$	310.29
“ Pyrophosphate	$Ca_2P_2O_7$	254.22
“ Sulphate (Gypsum)	$CaSO_4+2H_2O$	172.17
“ “ Anhydrous	$CaSO_4$	136.14
“ Sulphide (Monosulphide)	CaS	72.14
Camphor	$C_{10}H_{16}O$	152.13
“ Monobromated	$C_{10}H_{15}OBr$	231.04
Carbon	**C**	**12.00**
Carbon Dioxide	CO_2	44.00
“ Disulphide	CS_2	76.14
“ Tetrachloride	CCl_4	153.84
Carvone	$C_{10}H_{14}O$	150.11
Cephaeline	$C_{14}H_{19}O_2N$	233.16
Cerium	**Ce**	**140.25**
Cerium Oxalate (not U.S.P.)	$Ce_2(C_2O_4)_3+10H_2O$	724.66
“ “ Anhydrous	$Ce_2(C_2O_4)_3$	544.50
Chloral, Anhydrous	C_2HCl_3O	147.39
“ Hydrated	$C_2HCl_3O+H_2O$	165.40
Chloralformamide	$C_3H_4Cl_3O_2N$	192.42
Chlorine	**Cl**	**35.46**
Chloroform	$CHCl_3$	119.39
Chromium	**Cr**	**52.0**
Chromium Oxide	Cr_2O_3	152.0
“ Trioxide (Chromic Anhydride)	CrO_3	100.00

		O=16
Cinchonidine	$C_{19}H_{22}ON_2$	294.20
“ Salicylate	$C_{19}H_{22}ON_2C_7H_6O_3$	432.21
“ Sulphate	$(C_{19}H_{22}ON_2)_2H_2SO_4+3H_2O$.	740.53
“ “ Anhydrous	$(C_{19}H_{22}ON_2)_2H_2SO_4$	686.48
Cinchonine	$C_{19}H_{22}ON_2$	294.20
“ Sulphate	$(C_{19}H_{22}ON_2)_2H_2SO_4+2H_2O$.	722.51
“ “ Anhydrous	$(C_{19}H_{22}ON_2)_2H_2SO_4$	686.48
Cineol (Eucalyptol)	$C_{10}H_{18}O$	154.14
Cinnamic Aldehyde	C_9H_8O	132.06
Citral	$C_{10}H_{16}O$	152.13
Cobalt	**Co**	**58.97**
Cobaltous Chloride	$CoCl_2+6H_2O$	237.99
“ “ Anhydrous	$CoCl_2$	129.89
“ Nitrate	$Co(NO_3)_2+6H_2O$	291.09
“ “ Anhydrous	$Co(NO_3)_2$	182.99
“ Sulphate	$CoSO_4+7H_2O$	281.15
Cocaine	$C_{17}H_{21}O_4N$	303.18
“ Hydrochloride	$C_{17}H_{21}O_4NHCl$	339.65
Codeine (Methyl Morphine)	$C_{18}H_{21}O_3N+H_2O$	317.19
“ Anhydrous	$C_{18}H_{21}O_3N$	299.18
“ Phosphate	$C_{18}H_{21}O_3NH_3PO_4+2H_2O$	433.27
“ “ Anhydrous	$C_{18}H_{21}O_3NH_3PO_4$	397.24
“ Sulphate	$(C_{18}H_{21}O_3N)_2H_2SO_4+5H_2O$.	786.52
“ “ Anhydrous	$(C_{18}H_{21}O_3N)_2H_2SO_4$	696.44
Colchicine	$C_{22}H_{25}O_6N$	399.21
Columbium	**Cb**	**93.5**
Coniine	$C_8H_{17}N$	127.15
Copper	**Cu**	**63.57**
Cotarnine	$C_{12}H_{15}O_4N$	237.13
“ Hydrochloride	$C_{12}H_{14}O_3NCl$	255.58
“ Phthalate	$(C_{12}H_{15}O_4N)_2C_6H_4C_2H_2O_4$	640.31
Cresol	$C_6H_4(CH_3)OH$	108.06
Cupric-ammonium Sulphate	$Cu(NH_3)_4SO_4+H_2O$	245.79
Cupric Acetate	$Cu(C_2H_3O_2)_2+H_2O$	199.63
“ Sulphate	$CuSO_4+5H_2O$	249.72
“ “ Anhydrous	$CuSO_4$	159.64
“ Sulphide	CuS	95.64
“ Tartrate	$CuC_4H_4O_6+3H_2O$	265.65
“ “ Anhydrous	$CuC_4H_4O_6$	211.60
Diacetyl-morphine	$C_{21}H_{23}O_5N$	369.19
“ “ Hydrochloride	$C_{21}H_{23}O_5NHCl+H_2O$	423.68
“ “ “ Anhydrous	$C_{21}H_{23}O_5NHCl$	405.66
Diethyl-barbituric Acid	$C_8H_{12}O_3N_2$	184.12
Diethylsulphone-dimethyl-methane	$C_7H_{16}O_4S_2$	228.27
Diethylsulphone-methyl-ethyl-methane	$C_8H_{18}O_4S_2$	242.28
Dipentene	$C_{10}H_{16}$	136.13
Diphenylamine	$(C_6H_5)_2NH$	169.10

		O=16
Dithymol Diiodide (Thymol Iodide)	$(C_{10}H_{12}O)_2I_2$	550.03
Dysprosium	**Dy**	**162.5**
Emetine	$C_{15}H_{22}O_2N$	248.19
" Hydrochloride, Anhydrous	$C_{30}H_{44}O_4N_2\cdot 2HCl$	569.31
Epinephrine, Hydrated	$C_9H_{13}O_3N + \frac{1}{2}H_2O$	192.12
Erbium	**Er**	**167.7**
Erythrol Tetranitrate	$C_4H_6(NO_3)_4$	302.09
Ether (Ethyl Oxide)	$(C_2H_5)_2O$	74.08
Ethyl Acetate	$C_2H_5C_2H_3O_2$	88.06
" Carbamate	$CO(OC_2H_5)NH_2$	89.07
" Chloride	C_2H_5Cl	64.50
" Hydroxide (Ethyl Alcohol)	C_2H_5OH	46.05
Ethylmorphine Hydrochloride	$C_{19}H_{23}O_3NHCl+2H_2O$	385.69
" " Anhydrous	$C_{19}H_{23}O_3NHCl$	349.66
Ethyl Nitrite	$C_2H_5NO_2$	75.05
" Oxide (Ether)	$(C_2H_5)_2O$	74.08
Eucaine (Beta)	$C_{15}H_{21}O_2NHCl+H_2O$	301.66
Eucalyptol (Cineol)	$C_{10}H_{18}O$	154.14
Eugenol	$C_{10}H_{12}O_2$	164.10
Europium	**Eu**	**152.0**
Ferric Acetate	$Fe(C_2H_3O_2)_3$	232.91
" Ammonium Sulphate	$FeNH_4(SO_4)_2+12H_2O$	482.21
" " " Anhydrous	$FeNH_4(SO_4)_2$	266.02
" Chloride	$FeCl_3+6H_2O$	270.32
" " Anhydrous	$FeCl_3$	162.22
" Hydroxide	$Fe(OH)_3$	106.86
" Hypophosphite	$Fe(PH_2O_2)_3$	251.01
" Nitrate	$Fe(NO_3)_3$	241.87
" Oxide	Fe_2O_3	159.68
" Phosphate (normal, not U.S.P.)	$FePO_4$	150.88
" Pyrophosphate (normal, not U.S.P.)	$Fe_4(P_2O_7)_3$	745.60
" Subsulphate (variable)		
" Sulphate (Tersulphate)	$Fe_2(SO_4)_3$	399.89
Ferrous Bromide	$FeBr_2+6H_2O$	323.78
" " Anhydrous	$FeBr_2$	215.68
" Carbonate	$FeCO_3$	115.84
" Iodide	FeI_2	309.68
" Lactate	$Fe(C_3H_5O_3)_2+3H_2O$	287.97
" " Anhydrous	$Fe(C_3H_5O_3)_2$	233.92
" Oxide	FeO	71.84
" Sulphate	$FeSO_4+7H_2O$	278.02
" " Anhydrous	$FeSO_4$	151.91
" " Exsiccated (approximately)	$2FeSO_4+3H_2O$	357.87
" Sulphide	FeS	87.91
Ferrum	**Fe**	**55.84**
Fluorescein (Resorcinolphthalein)	$C_{20}H_{12}O_5$	332.10
Fluorine	**F**	**19.0**

		O = 16
Formaldehyde	$HCHO$	30.02
Fuchsin	$C_{20}H_{19}N_3HCl$	337.74
Gadolinium	**Gd**	**157.3**
Gallium	**Ga**	**69.9**
Germanium	**Ge**	**72.5**
Glucinum	**Gl**	**9.1**
Glucose (Grape Sugar)	$C_6H_{12}O_6$	180.10
Glycerin (Glycerol)	$C_3H_5(OH)_3$	92.06
Glyceryl Trinitrate (Nitroglycerin)	$C_3H_5(NO_3)_3$	227.07
Gold	**Au**	**197.2**
Gold Chloride (Gold Trichloride)	$AuCl_3$	303.58
Guaiacol	$C_7H_8O_2$	124.06
“ Carbonate	$(C_7H_7O)_2CO_3$	274.11
Helium	**He**	**3.99**
Hematein	$C_{16}H_{12}O_6$	300.10
Hematoxylin	$C_{16}H_{14}O_6+3H_2O$	356.16
Hexamethylenamine (Hexamethylene Tetramine)	$C_6H_{12}N_4$	140.14
Holmium	**Ho**	**163.5**
Holocaine	$C_{18}H_{22}O_2N_2$	298.20
“ Hydrochloride	$C_{18}H_{22}O_2N_2HCl$	334.66
Homatropine	$C_{16}H_{21}O_3N$	275.18
“ Hydrobromide	$C_{16}H_{21}O_3NHBr$	356.11
Hydrastine	$C_{21}H_{21}O_6N$	383.18
“ Hydrochloride	$C_{21}H_{21}O_6NHCl$	419.65
Hydrastinine Hydrochloride	$C_{11}H_{11}O_2NHCl$	225.57
Hydrogen	**H**	**1.008**
Hydrogen Dioxide	H_2O_2	34.02
“ Sulphide (Hydrosulphuric Acid)	H_2S	34.09
Hyoscine (see Scopolamine)		
Hyoscyamine	$C_{17}H_{23}O_3N$	289.19
“ Hydrobromide	$C_{17}H_{23}O_3NHBr$	370.12
“ Sulphate	$(C_{17}H_{23}O_3N)_2H_2SO_4$	676.47
Indigo Carmine (see Sodium indigotindisulphonate)		
Indium	**In**	**114.8**
Iodeosin (Tetraiodo-fluorescein)	$C_{20}H_8O_5I_4$	835.74
Iodine	**I**	**126.92**
Iodoform	CHI_3	393.77
Iodol (Tetraiodopyrrol)	C_4HNI_4	570.70
Iridium	**Ir**	**193.1**
Iron	**Fe**	**55.84**
Iron Salts (see under *Ferric* and *Ferrous*)		
Kaolin (Aluminum Silicate) (approximately)	$H_2Al_2(SiO_4)_2 + H_2O$	258.83
Krypton	**Kr**	**82.92**
Lanthanum	**La**	**139.0**
Lead	**Pb**	**207.10**

		O = 16
Lead Acetate	$Pb(C_2H_3O_2)_2+3H_2O$	379.20
" " Anhydrous	$Pb(C_2H_3O_2)_2$	325.15
" " Basic (see Lead Subacetate)		
" Carbonate, Basic	$(PbCO_3)_2Pb(OH)_2$	775.32
" Chloride	$PbCl_2$	278.02
" Chromate	$PbCrO_4$	323.10
" Dioxide	PbO_2	239.10
" Iodide	PbI_2	460.94
" Nitrate	$Pb(NO_3)_2$	331.12
" Oxide	PbO	223.10
" Peroxide	PbO_2	239.10
" Subacetate (approximately)	$Pb_2O(C_2H_3O_2)_2$	548.25
" Sulphate	$PbSO_4$	303.17
" Sulphide	PbS	239.17
Lime (Calcium Oxide)	CaO	56.07
Limonene	$C_{10}H_{16}$	136.13
Linalyl Acetate	$C_{10}H_{17}C_2H_3O_2$	196.16
Lithium	**Li**	**6.94**
Lithium Benzoate	$LiC_7H_5O_2$	127.98
" Bromide	$LiBr$	86.86
" Carbonate	Li_2CO_3	73.88
" Citrate	$Li_3C_6H_5O_7+4H_2O$	281.92
" Phosphate, Anhydrous	Li_3PO_4	115.86
" Salicylate	$LiC_7H_5O_3$	143.98
" Sulphate, Anhydrous	Li_2SO_4	109.95
Lutecium	**Lu**	**174.0**
Magnesia (Magnesium Oxide)	MgO	40.32
Magnesium	**Mg**	**24.32**
Magnesium Carbonate, Basic (approximately)	$(MgCO_3)_4Mg(OH)_2+5H_2O$	485.70
" Chloride	$MgCl_2+6H_2O$	203.34
" " Anhydrous	$MgCl_2$	95.24
" Hydroxide	$Mg(OH)_2$	58.34
" Oxide (Magnesia)	MgO	40.32
" Pyroarsenate	$Mg_2As_2O_7$	310.56
" Pyrophosphate	$Mg_2P_2O_7$	222.72
" Sulphate	$MgSO_4+7H_2O$	246.50
" " Anhydrous	$MgSO_4$	120.39
Manganese	**Mn**	**54.93**
Manganese Dioxide	MnO_2	86.93
" Hypophosphite	$Mn(PH_2O_2)_2+H_2O$	203.06
" " Anhydrous	$Mn(PH_2O_2)_2$	185.04
Manganous Oxide	MnO	70.93
" Sulphate	$MnSO_4+4H_2O$	223.06
" " Anhydrous	$MnSO_4$	151.00
Mannitol Hexanitrate	$C_6H_8(NO_3)_6$	452.12
Menthol	$C_{10}H_{19}OH$	156.16
Menthyl Acetate	$C_{10}H_{19}C_2H_3O_2$	198.18

		O=16
Mercurammonium Chloride	$HgNH_2Cl$	252.09
Mercuric Bromide	$HgBr_2$	360.44
“ Chloride	$HgCl_2$	271.52
“ Cyanide	$Hg(CN)_2$	252.62
“ Iodide	HgI_2	454.44
“ Nitrate	$Hg(NO_3)_2+4H_2O$	396.68
“ “ Anhydrous	$Hg(NO_3)_2$	324.62
“ Oxide	HgO	216.60
“ Potassium Iodide	HgI_2+2KI	786.48
“ Subsalicylate (approximately)	$HgC_7H_4O_3$	336.63
“ Subsulphate	$Hg(HgO)_2SO_4$	729.87
“ Sulphate	$HgSO_4$	296.67
“ Sulphide	HgS	232.67
Mercurous Chloride	$HgCl$	236.06
“ Iodide	HgI	327.52
“ Nitrate	$HgNO_3+H_2O$	280.63
“ “ Anhydrous	$HgNO_3$	262.61
“ Sulphate	Hg_2SO_4	497.27
Mercury	**Hg**	**200.6**
Mercury, Ammoniated	$HgNH_2Cl$	252.09
Methylacetanilid	$C_6H_5N(CH_3)C_2H_3O$	149.10
Methylaurin (Rosolic Acid)	$C_{20}H_{16}O_3$	304.13
Methylene Blue (Methylthionine Chloride)	$C_{16}H_{18}N_3ClS + 3H_2O$	373.75
Methyl Orange (Sodium dimethylaminoazobenzene-sulphonate)	$NaC_{14}H_{14}N_3SO_3$	327.21
Methyl Red	$C_{14}H_{14}N_3CO_2H$	269.15
“ Salicylate	$CH_3C_7H_5O_3$	152.06
Methylthionine Chloride (Methylene Blue)	$C_{16}H_{18}N_3ClS+3H_2O$	373.75
Molybdenum	**Mo**	**96.0**
Morphine	$C_{17}H_{19}O_3N+H_2O$	303.18
“ Anhydrous	$C_{17}H_{19}O_3N$	285.16
“ Acetate (variable)	$C_{17}H_{19}O_3NC_2H_4O_2+3H_2O$	399.24
“ Hydrochloride	$C_{17}H_{19}O_3NHCl+3H_2O$	375.68
“ “ Anhydrous	$C_{17}H_{19}O_3NHCl$	321.63
“ Sulphate	$(C_{17}H_{19}O_3N)_2H_2SO_4+5H_2O$	758.49
“ “ Anhydrous	$(C_{17}H_{19}O_3N)_2H_2SO_4$	668.41
Naphthalene	$C_{10}H_8$	128.06
Naphthol (Betanaphthol)	$C_{10}H_8O$	144.06
Naphthylamine Acetate	$C_{10}H_7NH_2HC_2H_3O_2$	203.11
“ Hydrochloride	$C_{10}H_7NH_2HCl$	179.55
Neodymium	**Nd**	**144.3**
Neon	**Ne**	**20.2**
Nickel	**Ni**	**58.68**
Nickelous Oxide	NiO	74.68
“ Sulphate	$NiSO_4+7H_2O$	280.86
“ “ Anhydrous	$NiSO_4$	154.75
Niton (radium emanation)	**Nt**	**222.4**

		O=16
Nitrogen	**N**	**14.01**
Nitric Oxide	NO	30.01
Nitrogen Monoxide	N_2O	44.02
Nitrous Oxide (Nitrogen Monoxide)	N_2O	44.02
Nitroglycerin (Glyceryl Trinitrate)	$C_3H_5(NO_3)_3$	227.07
Novocaine	$C_{13}H_{20}O_2N_2HCl$	272.65
Orthoform	$C_8H_9O_3N$	167.08
Osmium	**Os**	**190.9**
Ouabain	$C_{30}H_{46}O_{12}$	760.51
Oxygen	**O**	**16.00**
Palladium	**Pd**	**106.7**
Palladous Chloride	$PdCl_2$	177.62
Paraformaldehyde (Trioxymethylene)	$(CH_2O)_3$	90.05
Paraldehyde	$C_6H_{12}O_3$	132.10
Phenol (Carbolic Acid)	C_6H_5OH	94.05
Phenolphthalein	$C_{20}H_{14}O_4$	318.11
Phenylacetamide (Acetanilid)	C_8H_9ON	135.08
Phenylhydrazine	$C_6H_5NHNH_2$	108.08
“ Hydrochloride	$C_6H_5NHNH_2HCl$	144.55
Phenyl Salicylate (Salol)	$C_6H_5C_7H_5O_3$	214.08
Phloroglucinol	$C_6H_3(OH)_3$	126.05
Phosphorus	**P**	**31.04**
Physostigmine	$C_{15}H_{21}O_2N_3$	275.20
“ Salicylate	$C_{15}H_{21}O_2N_3C_7H_6O_3$	413.25
“ Sulphate	$(C_{15}H_{21}O_2N_3)_2H_2SO_4$	648.49
Picrotoxin	$C_{30}H_{34}O_{13}$	602.27
Pilocarpine	$C_{11}H_{16}O_2N_2$	208.15
“ Hydrochloride	$C_{11}H_{16}O_2N_2HCl$	244.62
“ Nitrate	$C_{11}H_{16}O_2N_2HNO_3$	271.17
Piperine	$C_{17}H_{19}O_3N$	285.16
Platinic Chloride (in solution)	$PtCl_4$	337.04
“ “ (Chloroplatinic Acid)	$H_2PtCl_6+6H_2O$	518.07
Platinum	**Pt**	**195.2**
Potassa (Potassium Hydroxide)	KOH	56.11
Potassium	**K**	**39.10**
Potassium Acetate	$KC_2H_3O_2$	98.12
“ Arsenite (Metarsenite)	$KAsO_2$	146.06
“ Benzoate	$KC_7H_5O_2+3H_2O$	214.19
“ “ Anhydrous	$KC_7H_5O_2$	160.14
“ Bicarbonate	$KHCO_3$	100.11
“ Bichromate (Dichromate)	$K_2Cr_2O_7$	294.20
“ Bisulphate	$KHSO_4$	136.18
“ Bitartrate	$KHC_4H_4O_6$	188.14
“ Bromate	$KBrO_3$	167.02
“ Bromide	KBr	119.02
“ Carbonate	K_2CO_3	138.20
“ Chlorate	$KClO_3$	122.56

		O = 16
Potassium Chloride	KCl	74.56
“ Chloroplatinate	K_2PtCl_6	486.16
“ Chromate	K_2CrO_4	194.20
“ Citrate	$K_3C_6H_5O_7+H_2O$	324.36
“ “ Anhydrous	$K_3C_6H_5O_7$	306.34
“ Cyanide	KCN	65.11
“ Dichromate (Bichromate)	$K_2Cr_2O_7$	294.20
“ Ferricyanide	$K_3Fe(CN)_6$	329.20
“ Ferrocyanide	$K_4Fe(CN)_6+3H_2O$	422.35
“ “ Anhydrous	$K_4Fe(CN)_6$	368.30
“ Hydroxide (Potassa)	KOH	56.11
“ Hypophosphite	KPH_2O_2	104.16
“ Iodide	KI	166.02
“ Lactate	$KC_3H_5O_3$	128.14
“ Nitrate	KNO_3	101.11
“ Permanganate	$KMnO_4$	158.03
“ Phosphate, Dibasic	K_2HPO_4	174.25
“ Salicylate	$KC_7H_5O_3$	176.14
“ and Sodium Tartrate	$KNaC_4H_4O_6+4H_2O$	282.20
“ “ “ “ Anhydrous	$KNaC_4H_4O_6$	210.13
“ Sulphate	K_2SO_4	174.27
“ Sulphite	$K_2SO_3+2H_2O$	194.30
“ “ Anhydrous	K_2SO_3	158.27
“ Sulphocyanate (Sulphocyanide)	$KCNS$	97.18
“ Tartrate	$K_2C_4H_4O_6+\frac{1}{2}H_2O$	235.24
“ “ Anhydrous	$K_2C_4H_4O_6$	226.23
Praseodymium	**Pr**	**140.6**
Pyrogallol (Pyrogallic Acid)	$C_6H_3(OH)_3$	126.05
Quinidine	$C_{20}H_{24}O_2N_2$	324.21
“ Sulphate	$(C_{20}H_{24}O_2N_2)_2H_2SO_4+2H_2O$	782.54
“ “ Anhydrous	$(C_{20}H_{24}O_2N_2)_2H_2SO_4$	746.51
Quinine	$C_{20}H_{24}O_2N_2+3H_2O$	378.26
“ Anhydrous	$C_{20}H_{24}O_2N_2$	324.21
“ Bisulphate	$C_{20}H_{24}O_2N_2H_2SO_4+7H_2O$	548.41
“ “ Anhydrous	$C_{20}H_{24}O_2N_2H_2SO_4$	422.30
“ Dihydrochloride	$C_{20}H_{24}O_2N_2.2HCl$	397.15
“ Hydrobromide	$C_{20}H_{24}O_2N_2HBr+H_2O$	423.16
“ “ Anhydrous	$C_{20}H_{24}O_2N_2HBr$	405.14
“ Hydrochloride	$C_{20}H_{24}O_2N_2HCl+2H_2O$	396.71
“ “ Anhydrous	$C_{20}H_{24}O_2N_2HCl$	360.68
“ Salicylate	$C_{20}H_{24}O_2N_2HC_7H_5O_3+H_2O$	480.28
“ “ Anhydrous	$C_{20}H_{24}O_2N_2HC_7H_5O_3$	462.26
“ Sulphate	$(C_{20}H_{24}O_2N_2)_2H_2SO_4+7H_2O$	872.62
“ “ Anhydrous	$(C_{20}H_{24}O_2N_2)_2H_2SO_4$	746.51
“ and Urea Hydrochloride	$C_{20}H_{24}O_2N_2HCl.CO(NH_2)_2HCl+5H_2O$	547.28
“ Valerate (Valerianate) (variable)	$C_{20}H_{24}O_2N_2HC_5H_9O_2+H_2O$	444.31

		O=16
Radium	**Ra**	**226.4**
Resorcinol (Resorcin)	$C_6H_4(OH)_2$	110.05
Resorcinolphthalein (Fluorescein)	$C_{20}H_{12}O_5$	332.10
Rhodium	**Rh**	**102.9**
Rosaniline Acetate	$C_{19}H_{18}N_3C_2H_4O_2$	348.21
Rubidium	**Rb**	**85.45**
Ruthenium	**Ru**	**101.7**
Saccharin (Benzosulphinide)	$C_7H_5O_3NS$	183.12
Safrol	$C_{10}H_{10}O_2$	162.08
Salicin	$C_{13}H_{18}O_7$	286.14
Salol (Phenyl Salicylate)	$C_6H_5C_7H_5O_3$	214.08
Samarium	**Sa**	**150.4**
Santalol	$C_{15}H_{26}O$	222.21
Santonin	$C_{15}H_{18}O_3$	246.14
Scandium	**Sc**	**44.1**
Scopolamine (Hyoscine)	$C_{17}H_{21}O_4N$	303.18
“ Hydrobromide	$C_{17}H_{21}O_4NHBr+3H_2O$	438.15
“ “ Anhydrous	$C_{17}H_{21}O_4NHBr$	384.11
Selenium	**Se**	**79.2**
Silicon	**Si**	**28.3**
Silicon Oxide (Silica)	SiO_2	60.30
Silver	**Ag**	**107.88**
Silver Chloride	$AgCl$	143.34
“ Cyanide	$AgCN$	133.89
“ Iodide	AgI	234.80
“ Nitrate	$AgNO_3$	169.89
“ Nitrite	$AgNO_2$	153.89
“ Oxide	Ag_2O	231.76
“ Sulphate	Ag_2SO_4	311.83
“ Sulphide	Ag_2S	247.83
Soda (Sodium Hydroxide)	$NaOH$	40.01
Sodium	**Na**	**23.00**
Sodium Acetate	$NaC_2H_3O_2+3H_2O$	136.07
“ “ Anhydrous	$NaC_2H_3O_2$	82.02
“ Arsenate	$Na_2HAsO_4+7H_2O$	312.08
“ “ Anhydrous	Na_2HAsO_4	185.97
“ Arsenite (Metarsenite)	$NaAsO_2$	129.96
“ Benzoate	$NaC_7H_5O_2$	144.04
“ Benzosulphinide (Soluble Saccharin)	$NaC_7H_4SNO_3+2H_2O$	241.14
“ Bicarbonate	$NaHCO_3$	84.01
“ Bisulphite	$NaHSO_3$	104.08
“ Bitartrate	$NaHC_4H_4O_6+H_2O$	190.06
“ Borate (Tetraborate)	$Na_2B_4O_7+10H_2O$	382.16
“ “ Anhydrous	$Na_2B_4O_7$	202.00
“ Bromate	$NaBrO_3$	150.92
“ Bromide	$NaBr$	102.92
“ Cacodylate	$Na(CH_3)_2AsO_2+3H_2O$	214.06

		O = 16
Sodium Cacodylate, Anhydrous	$Na(CH_3)_2AsO_2$	160.01
“ Carbonate	$Na_2CO_3+10H_2O$	286.16
“ “ Anhydrous	Na_2CO_3	106.00
“ “ Monohydrated	$Na_2CO_3+H_2O$	124.02
“ Chlorate	$NaClO_3$	106.46
“ Chloride	$NaCl$	58.46
“ Citrate	$Na_3C_6H_5O_7+2H_2O$	294.07
“ “ Anhydrous	$Na_3C_6H_5O_7$	258.04
“ Cobaltic Nitrite	$Co_2(NO_2)_66NaNO_2+H_2O$	826.08
“ Cyanide	$NaCN$	49.01
“ Dimethylaminoazo-benzene-sulphonate (Methyl Orange)	$NaC_{14}H_{14}N_3SO_3$	327.21
“ Glycerophosphate, Anhydrous	$Na_2C_3H_7PO_6$	216.10
“ Hydroxide (Soda)	$NaOH$	40.01
“ Hypophosphite	$NaPH_2O_2+H_2O$	106.07
“ “ Anhydrous	$NaPH_2O_2$	88.06
“ Hyposulphite (Thiosulphate)	$Na_2S_2O_3+5H_2O$	248.22
“ “ Anhydrous	$Na_2S_2O_3$	158.14
“ Indigotindisulphonate	$Na_2C_{16}H_8O_2N_2(SO_3)_2$	466.22
“ Iodide	NaI	149.92
“ Lactate	$NaC_3H_5O_3$	112.04
“ Monosulphide	Na_2S+9H_2O	240.21
“ “ Anhydrous	Na_2S	78.07
“ Nitrate	$NaNO_3$	85.01
“ Nitrite	$NaNO_2$	69.01
“ Nitroprusside	$Na_2Fe(NO)(CN)_5+2H_2O$	297.93
“ Oxalate	$Na_2C_2O_4$	134.00
“ Perborate	$NaBO_3+4H_2O$	154.06
“ “ Anhydrous	$NaBO_3$	82.00
“ Phenolsulphonate (Sulphocarbolate)	$NaC_6H_5SO_4+2H_2O$	232.14
“ “ Anhydrous	$NaC_6H_5SO_4$	196.11
“ Phosphate, Anhydrous	Na_2HPO_4	142.05
“ “ Dibasic	$Na_2HPO_4+12H_2O$	358.24
“ Pyrophosphate	$Na_4P_2O_7+10H_2O$	446.24
“ “ Anhydrous	$Na_4P_2O_7$	266.08
“ Salicylate	$NaC_7H_5O_3$	160.04
“ Sulphate	$Na_2SO_4+10H_2O$	322.23
“ “ Anhydrous	Na_2SO_4	142.07
“ Sulphide	Na_2S+9H_2O	240.21
“ Sulphite	$Na_2SO_3+7H_2O$	252.18
“ “ Anhydrous	Na_2SO_3	126.07
“ Sulphocarbolate (Phenolsulphonate)	$NaC_6H_5SO_4+2H_2O$	232.14
“ Tartrate	$Na_2C_4H_4O_6+2H_2O$	230.06
“ “ Anhydrous	$Na_2C_4H_4O_6$	194.03
“ Theobromine	$NaC_7H_7O_2N_4$	202.10
“ Thiosulphate (Hyposulphite)	$Na_2S_2O_3+5H_2O$	248.22
“ “ Anhydrous	$Na_2S_2O_3$	158.14

		O=16
Sodium Tungstate	$Na_2WO_4+2H_2O$	330.03
Sparteine	$C_{15}H_{26}N_2$	234.23
“ Sulphate	$C_{15}H_{26}N_2H_2SO_4+5H_2O$	422.39
“ “ Anhydrous	$C_{15}H_{26}N_2H_2SO_4$	332.31
Stannic Chloride	$SnCl_4$	260.84
Stannous Chloride	$SnCl_2+2H_2O$	225.95
“ “ Anhydrous	$SnCl_2$	189.92
Strontium	**Sr**	**87.63**
Strontium Bromide	$SrBr_2+6H_2O$	355.57
“ “ Anhydrous	$SrBr_2$	247.47
“ Carbonate	$SrCO_3$	147.63
“ Iodide	SrI_2+6H_2O	449.57
“ “ Anhydrous	SrI_2	341.74
“ Lactate	$Sr(C_3H_5O_3)_2+3H_2O$	319.76
“ “ Anhydrous	$Sr(C_3H_5O_3)_2$	265.71
“ Salicylate	$Sr(C_7H_5O_3)_2+2H_2O$	397.74
“ “ Anhydrous	$Sr(C_7H_5O_3)_2$	361.71
“ Sulphate	$SrSO_4$	183.70
Strychnine	$C_{21}H_{22}O_2N_2$	334.20
“ Nitrate	$C_{21}H_{22}O_2N_2HNO_3$	397.21
“ Sulphate	$(C_{21}H_{22}O_2N_2)_2H_2SO_4+5H_2O$	856.56
“ “ Anhydrous	$(C_{21}H_{22}O_2N_2)_2H_2SO_4$	766.48
Sugar, Cane (Sucrose)	$C_{12}H_{22}O_{11}$	342.18
“ Grape (Glucose)	$C_6H_{12}O_6$	180.10
“ Milk (Lactose)	$C_{12}H_{22}O_{11}+H_2O$	360.19
Sulphonethylmethane (Diethylsulphonemethylethylmethane)	$C_8H_{18}O_4S_2$	242.28
Sulphonmethane (Diethylsulphone-dimethylmethane)	$C_7H_{16}O_4S_2$	228.27
Sulphur	**S**	**32.07**
Sulphur Dioxide	SO_2	64.07
Tantalum	**Ta**	**181.5**
Tellurium	**Te**	**127.5**
Terbium	**Tb**	**159.2**
Terebene	$C_{10}H_{16}$	136.13
Terpin Hydrate	$C_{10}H_{18}(OH)_2+H_2O$	190.18
Tetraiodo-fluorescein (Iodeosin)	$C_{20}H_8O_5I_4$	835.74
Tetraiodopyrrol (Iodol)	C_4HNI_4	570.70
Tetramethylthionine Chloride (Methylthionine Chloride, Methylene Blue)	$C_{16}H_{18}N_3ClS+3H_2O$	373.75
Thallium	**Tl**	**204.0**
Theobromine	$C_7H_8O_2N_4$	108.10
Theophylline	$C_7H_8O_2N_4+H_2O$	198.12
Thiosinamine (Allyl-sulphocarbamide)	$(C_3H_5)SCN_2H_3$	116.15
Thorium	**Th**	**232.4**
Thulium	**Tm**	**168.5**
Thymol	$C_{10}H_{14}O$	150.11

		0 = 16
Thymol Iodide (Dithymol-diiodide)	$(C_{10}H_{12}O)_2I_2$	550.03
Tin	**Sn**	**119.0**
Tin Salts (See under *Stannic* and *Stannous*)		
Titanium	**Ti**	**48.1**
Toluene (Methyl Benzene, Toluol)	$C_6H_5CH_3$	92.06
Trinitrophenol (Picric Acid)	$C_6H_3O_7N_3$	229.05
Trioxymethylene (Paraform)	$(CH_2O)_3$	90.05
Tungsten	**W**	**184.0**
Uranium	**U**	**238.5**
Uranium Nitrate (Uranyl Nitrate)	$UO_2(NO_3)_2+6H_2O$	502.62
“ “ Anhydrous	$UO_2(NO_3)_2$	394.52
Vanadium	**V**	**51.0**
Vanillin	$C_8H_8O_3$	152.06
Water	H_2O	18.016
Xenon	**Xe**	**130.2**
Xylene (Xylol, Dimethyl-benzene)	$C_6H_4(CH_3)_2$	106.08
Ytterbium (Neoytterbium)	**Yb**	**172.0**
Yttrium	**Yt**	**89.0**
Zinc	**Zn**	**65.37**
Zinc Acetate	$Zn(C_2H_3O_2)_2+2H_2O$	219.45
“ “ Anhydrous	$Zn(C_2H_3O_2)_2$	183.42
“ Bromide	$ZnBr_2$	225.21
“ Carbonate (Normal, not U.S.P.)	$ZnCO_3$	125.37
“ Chloride	$ZnCl_2$	136.29
“ Iodide	ZnI_2	319.21
“ Oxide	ZnO	81.37
“ Perborate, Anhydrous	$(ZnBO_3)_2$	183.37
“ Phenolsulphonate (Sulphocarbolate)	$Zn(C_6H_5SO_4)_2+8H_2O$	555.72
“ “ Anhydrous	$Zn(C_6H_5SO_4)_2$	411.59
“ Phosphide	Zn_3P_2	258.19
“ Sulphate	$ZnSO_4+7H_2O$	287.55
“ “ Anhydrous	$ZnSO_4$	161.44
“ Sulphide	ZnS	97.44
“ Sulphocarbolate (Phenolsulphonate)	$Zn(C_6H_5SO_4)_2+8H_2O$	555.72
“ Valerate (Valerianate)	$Zn(C_5H_9O_2)_2+2H_2O$	303.55
Zirconium	**Zr**	**90.6**

Multiples of Some Atomic and Molecular Weights

Oxygen = 16

	1	2	3	4	5	6	7	8	9	
H	1.01	2.02	3.02	4.03	5.04	6.05	7.06	8.06	9.07	H
O	16.00	32.00	48.00	64.00	80.00	96.00	112.00	128.00	144.00	O
OH	17.01	34.02	51.02	68.03	85.04	102.05	119.06	136.06	153.07	OH
H_2O	18.02	36.03	54.05	72.06	90.08	108.10	126.11	144.13	162.14	H_2O
N	14.01	28.02	42.03	56.04	70.05	84.06	98.07	112.08	126.09	N
NH_2	16.03	32.05	48.08	64.10	80.13	96.16	112.18	128.21	144.23	NH_2
NH_3	17.03	34.07	51.10	68.14	85.17	102.20	119.24	136.27	153.31	NH_3
NH_4	18.04	36.08	54.13	72.17	90.21	108.25	126.29	144.34	162.38	NH_4
NO	30.01	60.02	90.03	120.04	150.05	180.06	210.07	240.08	270.09	NO
NO_2	46.01	92.02	138.03	184.04	230.05	276.06	322.07	368.08	414.09	NO_2
NO_3	62.01	124.02	186.03	248.04	310.05	372.06	434.07	496.08	558.09	NO_3
C	12.00	24.00	36.00	48.00	60.00	72.00	84.00	96.00	108.00	C
CH_3	15.02	30.05	45.07	60.10	75.12	90.14	105.17	120.19	135.22	CH_3
CO	28.00	56.00	84.00	112.00	140.00	168.00	196.00	224.00	252.00	CO
CO_3	60.00	120.00	180.00	240.00	300.00	360.00	420.00	480.00	540.00	CO_3
CN	26.01	52.02	78.03	104.04	130.05	156.06	182.07	208.08	234.09	CN
Cl	35.46	70.92	106.38	141.84	177.30	212.76	248.22	283.68	319.14	Cl
Br	79.92	159.84	239.76	319.68	399.60	479.52	559.44	639.36	719.28	Br
I	126.92	253.84	380.76	507.68	634.60	761.52	888.44	1015.36	1142.28	I
S	32.07	64.14	96.21	128.28	160.35	192.42	224.49	256.56	288.63	S
SO_3	80.07	160.14	240.21	320.28	400.35	480.42	560.49	640.56	720.63	SO_3
SO_4	96.07	192.14	288.21	384.28	480.35	576.42	672.49	768.56	864.63	SO_4
PO_4	95.04	190.08	285.12	380.16	475.20	570.24	665.28	760.32	855.36	PO_4
PH_2O_2	65.05	130.11	195.17	260.22	325.28	390.34	455.39	520.45	585.50	PH_2O_2
Na	23.00	46.00	69.00	92.00	115.00	138.00	161.00	184.00	207.00	Na
K	39.10	78.20	117.30	156.40	195.50	234.60	273.70	312.80	351.90	K
	1	2	3	4	5	6	7	8	9	

Reagents, Test Solutions and Volumetric Solutions

Introductory

Official Substances as Reagents.—Latin official names are not used as titles in the following list, the English names being preferred. Some official substances (chemicals, chemical solutions, etc.) are sufficiently pure to be used as reagents, if they comply with the tests of purity prescribed by the Pharmacopœia. In the case of other official substances, the presence of certain impurities, though immaterial for their use as medicines, renders them unsuitable for employment as reagents. Whenever a greater degree of purity is required than is provided for by the text of the Pharmacopœia, it will be specially mentioned in the following list.

Abbreviations and Signs Used:

T.S. = Test Solution.

V.S. = Volumetric Solution.

$\frac{N}{1}$ = Normal (see under " Volumetric Solutions," page 555).

$\frac{N}{2}$ = Half-normal; $\frac{N}{10}$ = Tenth-normal; $\frac{N}{50}$ = Fiftieth-normal; $\frac{N}{100}$ = Hundredth-normal; $\frac{N}{200}$ = Two-hundredth-normal.

$\frac{2N}{1}$ = Double-normal (sometimes written: 2N).

Keeping of Reagents.—Preserve reagents in bottles made of glass as free as possible from lead or arsenic and closed by well-ground glass stoppers or, in certain cases, rubber stoppers. Ground glass stoppers of bottles containing alkali hydroxides, ammonium sulphide, ammonia water, and other substances of alkaline reaction, which rapidly attack ground glass surfaces, are to be coated with a thin film of petrolatum.

Keep reagents which are easily affected by light, such as hydrogen sulphide T.S., ammonium sulphide T.S., chlorine water, silver nitrate T.S., etc., in bottles made of dark amber-colored glass.

NOTE.—As some of the following test solutions are in certain cases directed to be used in definite quantities, it is important that they always be prepared of the *exact strength prescribed* and measured at the standard temperature of 25° C.

Water, whenever required or mentioned as a solvent in the tests given in the Pharmacopœia, or in the preparation of any reagent, is always understood to be *distilled water.*

Reagents and Test Solutions

The reagents are arranged in alphabetical order and the test solutions are usually mentioned in connection with the principal chemical or other substance from which they are prepared.

Acetic Acid.—Use the official acetic acid (see page 6).

Acetic Anhydride (Acetic Acid Anhydride), $(CH_3.CO)_2O$.—A colorless, mobile, refractive liquid of pungent acetic odor, boiling at about 137° C. Specific gravity about 1.07 at 25° C. When poured into water it sinks at first, but gradually dissolves, forming acetic acid. Dilute 1 mil with about 50 mils of distilled water, add 5 mils of nitric acid, and mix well; the solution gives no reaction upon the addition of silver nitrate T.S. (*hydrochloric acid*). Evaporate 10 mils of acetic anhydride to dryness, completing the drying at 110° C.; the residue weighs not more than 0.5 milligrammes (*non-volatile matter*).

Dissolve 10 mils of acetic anhydride accurately weighed in sufficient distilled water to measure 100 mils and titrate 10 mils of this with normal potassium hydroxide V.S., using phenolphthalein T.S. as indicator; not less than 19.3 mils is required to neutralize 1 Gm. of acetic anhydride. Preserve acetic anhydride in glass-stoppered vials in a cool place.

Acetone.—Use the official acetone (see page 4).

Albumen Test Solution.—Carefully separate the white of a strictly fresh hen's egg from the yolk, shake it thoroughly with 100 mils of distilled water, and filter. This solution must be freshly made when required.

Alcohol, 94.9 per cent.—Use the official alcohol (see page 35) containing not less than 94.9 per cent., by volume, of C_2H_5OH at 15.6° C. Alcohol of lower strength is prepared as follows:

Alcohol, 90 per cent.—Mix 51 mils of alcohol (see page 35) with 3 mils of distilled water. The specific gravity of the mixture is 0.834 at 15.6° C., corresponding to 90 per cent., by volume, of C_2H_5OH.

Alcohol, 80 per cent.—Mix 45.5 mils of alcohol (see page 35) with 9.5 mils of distilled water. The specific gravity of the mixture is 0.864 at 15.6° C., corresponding to 80 per cent., by volume, of C_2H_5OH.

Alcohol, 70 per cent.—Mix 38.6 mils of alcohol (see page 35) with 15 mils of distilled water. The specific gravity of the mixture is 0.890 at 15.6° C., corresponding to 70 per cent., by volume, of C_2H_5OH.

Alcohol, Dehydrated. C_2H_5OH.—Use the official dehydrated alcohol (see page 36), containing not less than 99 per cent., by volume, of C_2H_5OH.

Ammonia, Spirit of.—An alcoholic solution of ammonia (NH_3) containing 10 per cent., by weight, of the gas. It responds to the tests for purity given under ammonia water (see page 53).

Ammonia Test Solution.—Use the official ammonia water (see page 53).

Ammonium Carbonate Test Solution.—Dissolve 20 Gm. of ammonium carbonate (see page 44) in a mixture of 20 mils of ammonia water and 65 mils of distilled water, and add sufficient distilled water to measure 100 mils.

Ammonium Chloride Test Solution.—Dissolve 10 Gm. of ammonium chloride, NH_4Cl (see page 44), in sufficient distilled water to measure 100 mils. In addition to the tests prescribed for this salt under ammonium chloride (see page 45), the following must be complied with when employed in the test for lead under citric acid, tartaric acid, potassium bitartrate, or potassium and sodium tartrate. Dissolve 3 Gm. of the salt in 10 mils of distilled water acidified with 1 drop of diluted hydrochloric acid in a test tube of colorless glass having an internal diameter of 2 cm., add 10 mils of hydrogen sulphide T.S., which must be perfectly clear and colorless, and mix well. The liquid must show no discoloration when viewed downward against a white surface.

Ammonium Molybdate Test Solution.—Mix 6.5 Gm. of finely powdered molybdic acid (see page 539) with 14 mils of distilled water and 14.5 mils of stronger ammonia water to effect solution. Cool and slowly add the solution, in small portions with agitation, to a well cooled mixture of 32 mils of nitric acid and 40 mils of distilled water. Allow the solution to stand for twenty-four hours and then filter through asbestos.

Preserve the test solution in the dark, and, if a sediment should form in it after some days, carefully decant the clear solution. This solution should be tested at frequent intervals. Add 2 mils of sodium phosphate T.S. to 5 mils of the reagent; an abundant yellow precipitate forms either at once or upon slight warming. If only a slight precipitation or yellow opalescence results, the reagent must be rejected. When employed as a reagent, ammonium molybdate T.S. is always added in large excess to the solution being tested, the latter having previously been strongly acidified with nitric acid.

Ammonium Nitrate, NH_4NO_3.—Colorless crystals, soluble in less than their own weight of water, and in about 10 parts of alcohol. This salt when used as a reagent conforms to the tests for purity given under ammonium chloride (see page 44) and in addition responds to the following tests: Ten mil portions taken separately of an aqueous solution of the salt (1 in 10), acidulated with a few drops of nitric acid, yield no turbidity on the addition of a few drops of silver nitrate T.S. (*chloride*) or a few drops of barium nitrate T.S. (*sulphate*). Dissolve 1 Gm. of ammonium nitrate in 10 mils of distilled water, add a few drops of potassium iodide T.S., 1 mil of acetic acid and a few drops of starch T.S.; no blue color is produced (*nitrite*).

Ammonium Oxalate Test Solution.—Dissolve 4 Gm. of crystallized ammonium oxalate, $(NH_4)_2C_2O_4+H_2O$, in sufficient distilled water to measure 100 mils, or dissolve 3.548 Gm. of purified oxalic acid (see page 541) in 90 mils of distilled water, add 13 mils of ammonia water, boil to expel any excess of ammonia, and dilute with distilled water to make 100 mils.

Evaporate 50 mils of the test solution and ignite the residue, or ignite 2 Gm. of the salt; it leaves not more than 0.02 Gm. of residue (*fixed impurities*). The precipitate produced by the addition of silver nitrate T.S. or by barium chloride T.S., when added to 25 mils of the test solution, dissolves without residue upon the addition of nitric acid (*chloride and sulphate*).

Ammonium Polysulphide Test Solution.—A yellow liquid, made by dissolving a small quantity of the official precipitated sulphur (see page 419) in colorless ammonium sulphide T.S.

Ammonium Sulphate, $(NH_4)_2SO_4$.—This salt must respond to the following tests for purity: Two Gm. yields not more than 0.002 Gm. of residue on ignition (*fixed impurities*). Five mils of an aqueous solution of the salt (1 in 10) does not respond to the Test for heavy metals (see Test No. 3). Five mils of a similar solution shows no turbidity upon the addition of nitric acid and silver nitrate T.S. (*chloride*). Another 5 mils of the solution (1 in 10) is not colored red upon the addition of 1 mil of hydrochloric acid and 1 drop of ferric chloride T.S. (*sulphocyanate*). This salt may be prepared by cautiously neutralizing ammonia water with sulphuric acid, which has been previously diluted with about two volumes of distilled water, evaporating and crystallizing. During the evaporation, the solution should be tested with litmus paper, from time to time adding more ammonia if necessary to keep the liquid alkaline.

Ammonium Sulphide Test Solution.—Saturate 3 parts of ammonia water (see page 53) with hydrogen sulphide, prepared as directed on page 535, and add to the solution (which now contains ammonium hydrogen sulphide, NH_4HS) 2 parts of ammonia water, which converts the greater portion of the ammonium hydrogen sulphide into ammonium sulphide, $(NH_4)_2S$. Ten mils of the clear ammonium sulphide T.S., when evaporated to dryness and then gently ignited, leaves a residue weighing not more than 0.005 Gm. (*non-volatile matter*). It is not rendered turbid either by magnesium sulphate T.S. (*free ammonia*), or by calcium chloride T.S. (*ammonium carbonate*). Protect it from air and light by keeping it in small, dark amber-colored bottles, in a cool, dark place. As soon as a notable deposit of sulphur has made its appearance in the solution reject it.

Ammonium Vanadate (Ammonium Metavanadate), NH_4VO_3.—A white crystalline powder, soluble in about 100 parts of cold water and readily soluble in boiling water, forming a yellow liquid. This color is due to partial decomposition through loss of ammonia. When heated the salt assumes a yellow color which changes to brown, then reddish-brown, as the temperature rises.

Amyl Alcohol, $C_5H_{11}OH$.—A colorless, oily liquid having a penetrating characteristic odor, boiling between 128° and 132° C.; soluble in 40 parts of water at 25° C.; miscible with alcohol, ether, chloroform, carbon disulphide, petroleum benzin, benzene, or fixed or volatile oils. Ten mils of amyl alcohol, when evaporated to dryness on a water bath, yields not more than 0.0005 Gm. of residue.

Aniline (Phenylamine), $C_6H_5NH_2$.—When freshly distilled, aniline is a colorless, strongly refractive, oily liquid, having a peculiar, aromatic odor and a pungent, burning taste. Upon exposure to the light and air, it rapidly assumes a reddish-brown color. Specific gravity, about 1.02 at 25° C. Aniline distils completely between 182° and 184° C. It is soluble in alcohol, ether, or the fixed or volatile oils. With acids, it forms soluble crystalline salts. When added to an aqueous solution of calcium or sodium hypochlorite, a blue or purple color is produced. Preserve it in amber-colored bottles.

Aniline Sulphate, $(C_6H_5NH_2)_2H_2SO_4$.—Add gradually 10 Gm. of aniline, $C_6H_5NH_2$, to about 7 Gm. of sulphuric acid, stirring constantly. Dissolve the resulting solid mass in sufficient boiling diluted alcohol and set it aside for crystallization. Collect the crystals upon a filter, and, after draining them, recrystallize the salt from diluted alcohol. Collect the crystals on a filter and finally dry them in a desiccator. Aniline sulphate forms white crystals very soluble in water, less soluble in diluted alcohol, and slightly soluble in alcohol.

Aniline Sulphate Test Solution.—Dissolve 5 Gm. of aniline sulphate in 40 mils of distilled water, add 51 mils of diluted alcohol (see page 37) and sufficient distilled water to make 100 mils.

Arsenic Acid (Ortho-arsenic Acid), $H_3AsO_4+\frac{1}{2}H_2O$.—In white crystals or as a crystalline mass, very hygroscopic, readily soluble in water and alcohol. It fuses at about 100° C., becoming anhydrous at 110° C. At higher temperatures, it is converted into the pyro-acid and, finally, at 200° C. into the meta-acid. The addition of silver nitrate T.S. to an aqueous solution of arsenic acid, followed by the gradual addition of ammonia water, drop by drop, produces a red-brown precipitate which is readily soluble in a slight excess of ammonia water. With magnesia mixture T.S., arsenic acid solutions give a white crystalline precipitate. One mil of an aqueous solution of the salt (1 in 10) after neutralizing with sodium carbonate does not decolorize 1 drop of iodine T.S. (*arsenous oxide*). To 10 mils of a solution of ferrous sulphate (1 to 10) add 0.5 mil of an aqueous solution of arsenic acid (1 in 10) and float this over concentrated sulphuric acid contained in a test tube; no brown ring is formed at the zone of contact (*nitric acid*).

Arsenic Acid Test Solution, Concentrated.—For use in the assay for eucalyptol prepare this solution by dissolving 85 Gm. of crystalline arsenic acid (see above) in sufficient distilled water to make the product weigh 100 Gm. This solution has a specific gravity of about 2.173 at 25° C. The test solution may also be prepared by adding 56 Gm. of arsenic trioxide, in small portions, to 60 mils of nitric acid contained in a porcelain evaporating dish, stirring continuously and warming gently to assist the evolution of nitrous vapors. When all of the arsenic trioxide has been added, evaporate to a syrupy consistence, add about 25 mils of distilled water and again evaporate, and then repeat this operation once more. Finally dilute with distilled water until the solution weighs 100 Gm. This solution must comply with the tests for identity and purity given under *Arsenic Acid* (page 524). If the tests indicate the presence of arsenous oxide, more nitric acid must be added and the evaporation repeated. If nitric acid is present, the solution should be repeatedly diluted and evaporated.

Arsenic Trioxide (Arsenous Oxide), As_2O_3.—For use in the *Arsenic Test* use arsenic trioxide which complies with the description and tests given in Part I (see page 64).

Asbestos.—The anhydrous, silky, well-matted variety (not serpentine), commercially known as "Asbestos Wool," which when moistened readily wads when rolled between the fingers. For use as a filtering medium for the "Gooch" crucible, remove the soluble matter by boiling it for one hour with diluted hydrochloric acid, and washing it with boiling water, by decantation, until free from acid. Finally transfer it to a wide-mouthed bottle containing distilled water. When desired for use, shake the mixture and pour it into a Gooch crucible which is attached to a suction pump, distributing the asbestos uniformly over the bottom in a layer sufficiently thick to retain a precipitate.

Azolitmin.—See under *Indicators* (page 579).

Azolitmin Test Solution.—See under *Indicators* (page 579).

Azur II (Azur Blue II, Methylene-Azur II).—A mixture of equal parts of the chlorides of methylene blue (tetramethylthionine) and methylene-azur (methylene blue sulphonate). A dark green powder, entirely soluble in water with a deep blue color, less soluble in alcohol and slightly soluble in chloroform; insoluble in ether. The addition of tannic acid T.S. to an aqueous solution of azur II (1 in 1000) produces a blue precipitate. The addition of a few drops of hydrochloric acid to a mixture of 5 mils of an aqueous solution of this dye (1 in 1000) and 0.5 Gm. of zinc dust causes decolorization. When the decolorized mixture is filtered, and solution of hydrogen dioxide is added, the deep blue color is restored (reduction to leuco base and reoxidation). The addition of either hydrochloric acid or ammonia water to an aqueous solution of azur II (1 in 1000) produces no change. The addition of sodium hydroxide T.S. to an aqueous solution of azur II (1 in 1000) produces a violet coloration; upon heating the solution a violet precipitate is formed. The addition of potassium iodide T.S. to an aqueous solution of the dye (1 in 1000) produces a violet precipitate; the addition of potassium dichromate T.S. produces a red-violet precipitate. Azur II dissolves in concentrated sulphuric acid with a bright green color [distinction from *methylene violet* (dimethylthionolin)]; upon cautiously diluting with distilled water the solution assumes a blue color, remaining clear. Acidulate an aqueous solution of azur II (1 in 1000) with a few drops of hydrochloric acid, then shake it with ether, remove the ethereal layer, and shake it with a diluted solution of sodium hydroxide T.S.; the latter remains uncolored (distinction from *azur II-eosin*).

Azur II-Eosin.—A mixture of methylene blue eosin (methylene blue eosinate) and methylene-azur-eosin (methylene blue sulphone-eosinate). A dark green powder only very slightly soluble in water, more readily soluble in alcohol or glycerin. A warm saturated aqueous solution of azur II-eosin (about 1 in 2000) possesses a blue color with intense shading into violet. Highly dilute solutions possess a slight, greenish opalescence. Its solutions in alcohol or glycerin possess the same color with a strong yellowish-green fluorescence. A saturated aqueous solution of azur II-eosin is precipitated upon the addition of tannic acid T.S. The addition of zinc dust and ammonia water to an aqueous solution of this dye causes decolorization. When filtered, the colorless filtrate, upon standing in the air, quickly assumes a blue color (reduction to a leuco base and reoxidation to original color). A hot, saturated and filtered, aqueous solution of azur II-eosin assumes a pale blue color upon the addition of hydrochloric acid, and the dye separates in blue floccules. If this acid solution is agitated with ether and the ethereal layer removed and shaken with diluted sodium hydroxide T.S., the latter assumes an eosin color (distinction from *azur II*). The addition of sodium hydroxide T.S. to a saturated aqueous solution of azur II-eosin intensifies its violet color. Azur II-eosin dissolves in concentrated sulphuric acid with a deep green color which, upon dilution with water, changes to a blue, a portion of the dye (eosin) separating in floccules (distinction from *azur II*).

Barium Chloride, $BaCl_2+H_2O$.—Transparent crystals, easily soluble in water, almost insoluble in alcohol or concentrated hydrochloric acid. An aqueous solution of the salt (1 in 20) is neutral and does not respond to the Test for heavy metals (see Test No. 3). Dissolve 2 Gm. of barium chloride in 100 mils of distilled water, add 2 mils of hydrochloric acid, heat to boiling, then add a slight excess (about 10 mils) of diluted sulphuric acid, set it aside for twelve hours, and filter. The clear filtrate, on evaporating and igniting, yields a residue weighing not more than 0.002 Gm. (*other fixed bases*). Shake 1 Gm. of the finely powdered salt with 20 mils of dehydrated alcohol during five minutes and filter; the filtrate on evaporation and ignition yields not more than 0.002 Gm. of residue (*strontium and calcium*).

Barium Chloride Test Solution.—Dissolve 10 Gm. of barium chloride in sufficient distilled water to measure 100 mils.

Barium Hydroxide, $Ba(OH)_2+8H_2O$.—White crystals, soluble in about 20 parts of cold water and 3 parts of boiling water. The salt readily absorbs carbon dioxide from the air, forming an insoluble carbonate, hence aqueous solutions are more or less turbid. A solution of 1 Gm. of barium hydroxide in 50 mils of distilled water and 5 mils of nitric acid shows no opalescence upon the addition of silver nitrate T.S. (*chloride*). Dissolve 2 Gm. of the salt in 100 mils of distilled water, add 5 mils of hydrochloric acid, heat to boiling, then add a slight excess of diluted sulphuric acid, set it aside for twelve hours, and filter; the clear filtrate, on evaporating and igniting, yields a residue weighing not over 0.003 Gm. (*other fixed bases*). The solution of 1 Gm. of barium hydroxide in 20 mils of distilled water rendered acid with hydrochloric acid, does not respond to the Test for heavy metals (see Test No. 3). One Gm. of barium hydroxide dissolved in 100 mils of distilled water requires not less than 6.3 mils of normal hydrochloric acid V.S. for neutralization, using methyl orange T.S. or methyl red T.S. as indicator. Each mil of normal hydrochloric acid V.S. corresponds to 0.157755 Gm. of barium hydroxide [$Ba(OH)_2+8H_2O$].

Barium Hydroxide Test Solution.—A saturated solution of barium hydroxide, (see above) in recently boiled distilled water. This solution rapidly absorbs carbon dioxide from the air. Prepare a fresh solution when required for use.

Barium Nitrate, $Ba(NO_3)_2$.—Colorless crystals, soluble in 20 parts of cold water and 2.8 parts of boiling water; its solution is neutral to litmus. The addition of silver nitrate T.S. to an aqueous solution of the salt (1 in 20) produces no change (*chloride*). Barium nitrate meets the requirements of the tests for "other fixed bases" and "heavy metals" given under *Barium Chloride* (see above).

Barium Nitrate Test Solution.—Dissolve 5 Gm. of barium nitrate in sufficient distilled water to measure 100 mils.

Beef Extract (Meat Extract).—Use extract of beef complying with the tests of the U. S. Department of Agriculture, preferably the kind known as "Liebig's."

Benzene (Benzol or Benzole).—Benzene, C_6H_6, is a colorless, transparent, inflammable liquid of a peculiar, aromatic odor; specific gravity about 0.876 at 25° C.; congealing at about 5.2° C.; boiling between 79° and 80.4° C. It is insoluble in water, but soluble in 4 parts of alcohol and also in ether. When equal volumes of benzene and concentrated sulphuric acid are shaken together, the latter is not colored. Shake 2 mils of benzene with 0.5 mil of sulphuric acid and 1 drop of fuming nitric acid; no green or blue tint is produced (*thiophene*).

Benzidine (Paradiaminodiphenyl), $(C_6H_4)_2(NH_2)_2$.—A white or slightly reddish crystalline powder. It is very slowly soluble in cold water, more readily in boiling water; soluble in alcohol and in ether. It melts at about 128° C. On adding a few drops of barium chloride T.S. to a solution of 1 Gm. of benzidine in 50 mils of distilled water acidulated with 5 mils of hydrochloric acid, no turbidity is produced (*sulphate*). One Gm. of benzidine upon ignition leaves no weighable residue.

Benzin (Petroleum Benzin).—Use the official purified petroleum benzin.

Beta-iminazolyl-ethylamine Hydrochloride.—Used in standardizing solution of the pituitary body (see page 247).

Blood Serum.—The serum filtered from the clotted blood of the horse or ox.

Bromine, Br.—Preserve it in a glass-stoppered bottle in a cool place, the bottle being enclosed in a larger vessel with the space between filled with some substance (as calcium hydroxide) capable of absorbing and combining with any vapors which might be given off. A heavy, dark brownish-red, mobile liquid, evolving, even at ordinary temperatures, reddish fumes, highly irritating to the eyes and lungs, and having a peculiar, suffocating odor, resembling that of chlorine. Specific gravity about 3.1 at 25° C. Boiling point, about 63° C. Bromine is soluble in 90 times its volume of water at 25° C.; freely soluble in alcohol or ether (with gradual decomposition of these solvents); also soluble in chloroform, carbon disulphide, or carbon tetrachloride with a deep reddish-yellow color. On exposure to air or to heat, it is volatilized. Bromine destroys the color of solutions of litmus or indigo, and imparts a yellow color to starch T.S. Add 5 mils of bromine to an excess of potassium hydroxide T.S.; it combines to form a permanently clear liquid, without the separation of oily drops (*organic bromine compounds*). Shake 10 mils of a saturated aqueous solution of bromine with a slight excess of reduced iron until it becomes nearly colorless; the filtered liquid, on the addition of 5 drops of ferric chloride T.S. and of 5 drops of starch T.S., does not assume a blue color (*iodine*).

Bromine Test Solution (Bromine Water).—A saturated aqueous solution of bromine prepared by adding 3 mils of bromine to 100 mils of cold distilled water contained in a glass-stoppered bottle, the stopper of which should be lubricated with petrolatum. Keep this reagent in a cool place, protected from light, and shake it well, allowing the excess of bromine to settle, before using.

Cadmium and Potassium Iodide.—A mixture of equal weights of cadmium iodide and potassium iodide (see page 340) may be employed. A white powder readily soluble in water or alcohol. Upon keeping, it acquires a yellowish color. Dissolve 1 Gm. of the powder in 20 mils of distilled water, add 5 mils of potassium hydroxide T.S., and filter the solution; the filtrate yields no precipitate with hydrogen sulphide T.S. either before or after acidulating with hydrochloric acid (*foreign metals*). An aqueous solution of the salt (1 in 20) prepared with distilled water, which has been previously boiled and cooled, gives no blue color upon the addition of starch T.S. (*free iodine*).

Cadmium Chloride, $CdCl_2+2H_2O$.—Small white crystals which effloresce in dry air and are soluble in about 0.7 part of cold or hot water. An aqueous solution of the salt gives a yellow precipitate with ammonium sulphide T.S. which is insoluble in an excess of the reagent.

Cadmium Chloride Test Solution.—Dissolve 10 parts of cadmium chloride in sufficient distilled water to make 100 parts.

Cadmium Iodide, CdI_2.—Colorless to yellowish, glossy scales, soluble in 1.1 parts of cold water and in 0.75 part of boiling water, readily soluble in alcohol. Solutions of this salt, upon the addition of alkali hydroxides, yield a white precipitate of cadmium hydroxide insoluble in an excess of the reagent; the precipitate produced by the addition of ammonia water is soluble in an excess of the reagent. Hydrogen sulphide T.S. or ammonium sulphide T.S. added to an aqueous solution of the salt yields yellow cadmium sulphide which is insoluble in an excess of the latter reagent. Add 10 mils of potassium hydroxide T.S. to a solution of 1 Gm. of cadmium iodide in 20 mils of distilled water, and filter; the filtrate yields no precipitate with hydrogen sulphide T.S. either before or after acidulating with hydrochloric acid (*foreign metals*).

Calcium Chloride Test Solution.—Dissolve 10 Gm. of calcium chloride (see page 90) in sufficient distilled water to measure 100 mils.

Calcium Hydroxide Test Solution (Lime Water), a nearly saturated, aqueous solution of calcium hydroxide, $Ca(OH)_2$.—Use lime water (see page 239).

Calcium Sulphate Test Solution.—Introduce pulverized transparent crystals of native gypsum (selenite), $(CaSO_4+2H_2O)$, into a bottle nearly filled with distilled water, agitate it at intervals for twelve hours, and decant the clear, saturated solution when required. One part of gypsum requires about 400 parts of water for solution at 25° C. The test solution may also be made by shaking together 1 Gm. of calcium carbonate and 200 mils of distilled water, containing 5 mils of diluted sulphuric acid. When the acid is completely neutralized filter the mixture.

Canada Turpentine.—A liquid oleoresin obtained from *Abies balsamea* (Linné) Miller (Fam. *Coniferæ*). Viscid, pale yellowish or greenish-yellow, transparent; odor agreeable, taste terebinthinate, bitter, and slightly acrid; it is completely soluble in ether, chloroform, or benzene. When exposed to the air, Canada turpentine gradually dries and forms a transparent varnish; it solidifies on being mixed with 20 per cent. of its weight of magnesium oxide previously moistened with water.

Carbon Disulphide, CS_2(Carbon Bisulphide).—Preserve in partially filled, well-stoppered bottles, or in tin cans, in a cool place, remote from flame or fire. A clear, colorless, highly refractive liquid, very volatile, having a strong, characteristic but not fetid odor, and a sharp, aromatic taste. Specific gravity between 1.256 and 1.257 at 25° C. Soluble in about 530 parts of water at 25° C.; very soluble in alcohol, ether, chloroform, or fixed or volatile oils. Carbon disulphide vaporizes rapidly at the ordinary temperature, is highly inflammable, boils between 46° and 49° C., and when ignited, burns with a bluish-white flame, producing carbon dioxide and sulphur dioxide. It does not affect the color of blue litmus paper moistened with water (*sulphur dioxide*). Twenty mils when allowed to evaporate spontaneously in a glass dish and finally on a water bath leaves not more than 0.001 Gm. of residue (*dissolved sulphur*). No discoloration is produced in 10 mils of lead acetate T.S. after agitating with 25 mils of carbon disulphide, when viewed from above in a test tube of about 2 cm. in diameter (*hydrogen sulphide*).

Carbon Tetrachloride, CCl_4.—A colorless, heavy liquid, of characteristic odor; non-inflammable; specific gravity about 1.58 at 25° C.; boiling point between 76° and 77° C. It is immiscible with water, but miscible with dehydrated alcohol, ether, or fixed or volatile oils. Shake 10 mils with 20 mils of distilled water and allow the liquids to separate completely; the water remains neutral to litmus, and becomes not more than slightly opalescent on the addition of silver nitrate T.S. (*chloride*), and is not colored by potassium iodide T.S. (*chlorine*). Twenty-five mils when evaporated on a water bath leaves not more than 0.0005 Gm. of residue (*non-volatile matter*). To 10 mils of a solution of potassium hydroxide in dehydrated alcohol (1 in 10), add 10 mils of carbon tetrachloride; after standing for one hour, acidify with acetic acid and add 1 mil of copper sulphate T.S.; no yellow precipitate appears within two hours (*carbon disulphide*).

Carmine.—A lake color obtained from cochineal by the precipitation of its aqueous infusion with inorganic salts and albumen. Bright red, light and friable lumps, insoluble in cold water and acids, partially soluble in hot water, soluble in ammonia water with a dark red color. When dried at 100° C., 1 Gm. of carmine loses not more than 0.25 Gm. in weight; the residue ignited cautiously in a porcelain crucible, leaves not more than 0.12 Gm. of ash. During the ignition no odor like that of phenol or bromine is perceptible (*aniline colors*). Excepting for a few floccules, 0.15 Gm. of carmine dissolves completely in a mixture of 5 mils of ammonia water and 20 mils of distilled water.

Chlorine Test Solution (Chlorine Water).—Place 10 Gm. of manganese dioxide (see page 266) in a flask connected by a suitable tube with a small wash bottle containing 50 mils of water, and connect this with a bottle having a capacity of 1000 mils and containing 400 mils of distilled water which has previously been boiled and allowed to cool. Add to the dioxide in the generating flask 25 mils of hydrochloric acid, previously diluted with 25 mils of water, and apply a gentle heat by means of a sand bath. Conduct the generated chlorine through the water contained in the wash bottle into the bottle containing the distilled water, which should be loosely stopped with cotton and kept, during the operation, at a temperature of about 10° C. When the air has been entirely displaced by the gas, disconnect the bottle from the apparatus, and, having inserted the stopper, shake the bottle, loosening the stopper from time to time, until the gas ceases to be absorbed. If necessary, reconnect the bottle with the apparatus, and continue passing the gas and agitating, until the distilled water is saturated. Finally, pour the chlorine water into small, dark amber-colored, glass-stoppered bottles, which should be completely filled, and preserve them in a dark and cool place

Chlorine Water, even when kept from light and air, is apt to deteriorate. When it is required of full strength, it should be freshly prepared.

Chloroform, $CHCl_3$.—Use chloroform (see page 108).

Cobaltous Chloride, $CoCl_2+6H_2O$.—Rose-colored, monoclinic crystals, non-hygroscopic, soluble in water or alcohol. Dissolve 2 Gm. of the salt in about 100 mils of distilled water, completely precipitate the cobalt by the addition of an excess of ammonia water followed by ammonium sulphide T.S., and filter; the filtrate, after evaporation and ignition, leaves not more than 0.008 Gm. of residue (*alkali salts*). Add 3 Gm. of sodium cyanide to a solution of 1 Gm. of cobaltous chloride, in about 20 mils of distilled water, boil until the solution acquires a yellow color and filter it; on the addition of about 1 mil of bromine followed by sufficient potassium hydroxide T.S. to render the solution strongly alkaline no brown color develops (*nickel*). No coloration is produced in a solution of 2 Gm. of the salt in 100 mils of distilled water, to which 2 mils of nitric acid has been added, upon the addition of hydrogen sulphide T.S. (*lead and copper*).

Cobaltous Chloride Test Solution.—Dissolve 2 Gm. of cobaltous chloride with the aid of 1 mil of hydrochloric acid in sufficient distilled water to measure 100 mils.

Cochineal Test Solution.—See under *Indicators* (page 579).

Congo Red.—See under *Indicators* (page 579).

Congo Red Test Solution.—See under *Indicators* (page 580).

Copper, Metallic, Cu.—In the form of wire, foil, or turnings.

Cupric Acetate, $Cu(C_2H_3O_2)_2+H_2O$.—Bluish-green crystals, having an acetous odor, soluble in water or alcohol. An aqueous solution of the salt (1 in 20), mixed with a few drops of hydrochloric acid, is not rendered more than slightly turbid at once, upon the addition of a few drops of barium chloride T.S. (*sulphate*). In other respects it meets the tests for purity directed under *Cupri Sulphas* (see page 128).

Cupric Acetate Test Solution.—Dissolve 1 part of cupric acetate in sufficient distilled water to make 1000 parts. Should the solution become cloudy, add acetic acid, drop by drop, until it becomes clear.

Cupric Ammonium Sulphate Test Solution.—A solution of cupri-tetrammonium sulphate, $Cu(NH_3)_4SO_4+H_2O$. To copper sulphate T.S. add ammonia water, drop by drop, until the precipitate at first formed is nearly, but not completely redissolved, then filter. This solution should be freshly made when required.

Cupric Sulphate Test Solution.—Dissolve 10 Gm. of copper sulphate (see page 128) in sufficient distilled water to measure 100 mils.

Cupric Tartrate Test Solution.—See *Volumetric Solutions* (page 557).

Curare.—Curare is an impure vegetable extract prepared by the Indians of South America and used by them as an arrow poison. Its composition is not entirely known, and different specimens of curare vary, depending upon the special variety of plant used in its manufacture. The most important source of curare is the bark of several varieties of *Strychnos*, the species most commonly employed being *S. Castelnæi*, Wedd., *S. Toxifera, or S. Crevauxii.* In addition to the extract of these barks other substances are added to impart consistence, to mislead, or perhaps from superstitious considerations. Commercial curare is a brownish or black, shining resinoid mass, possessing a very bitter taste. About 75 per cent. is soluble in cold water and it is almost completely soluble in diluted alcohol.

Dimethylaminoazobenzene (Butter Yellow), $C_6H_5N : N.C_6H_4N(CH_3)_2$.—It forms yellow plates melting between 115° and 117° C. It is insoluble in water, soluble in alcohol; soluble in hydrochloric acid with a red color from which solution sodium hydroxide T.S. in excess precipitates the orange-yellow base. The solution of this dye in sulphuric acid is yellow and changes to red on dilution with water.

Diphenylamine, $(C_6H_5)_2NH$.—In the form of grayish-white or colorless crystals, of a peculiar, aromatic odor, melting between 53° and 54° C.; slightly soluble in water, more soluble in acids. It is used either in the dry state, or in solution in sulphuric acid, as a test for nitric acid (in sulphuric acid, water, etc.), or for chlorine (in hydrochloric acid). To test a solution for the presence of nitric acid, a small portion of it is carefully poured down the side of a test tube, slightly inclined and containing a few mils of diphenylamine T.S. so as to form a layer over the latter. The presence of nitric acid is shown by a deep blue color at the zone of contact. A similar reaction is also produced by the presence of hypochlorites, chlorates, chromium trioxide, ferric salts, and similar oxidizing agents.

Diphenylamine Test Solution.—Dissolve 0.5 Gm. of diphenylamine in 100 mils of concentrated sulphuric acid (see page 552) diluted with 20 mils of distilled water. The solution should be colorless.

Eosin A (Yellowish Eosin), $O[C_6H(Br_2O)_2Na]C.C_6H_4COONa$.—The sodium salt of tetra-brom-fluorescein. Fine red crystals of bluish, glossy luster, or a brownish-red powder; readily soluble in water, less soluble in alcohol and insoluble in ether. A concentrated aqueous solution of eosin A has a deep brownish-red color while a dilute solution (1 in 500) is yellowish-red with a greenish fluorescence. The alcoholic solutions show a yellowish-green fluorescence. The addition of tannic acid T.S. to an aqueous solution of eosin A (1 in 500), produces no change. When about 0.5 Gm. of zinc dust, followed by 5 mils of ammonia water, is added to 5 mils of an aqueous solution of eosin A (1 in 500) and the mixture agitated, rapid decolorization takes place. When this mixture is filtered, the addition of solution of hydrogen dioxide to the filtrate restores the pink color of the solution. The addition of hydrochloric acid to an aqueous solution (1 in 500) causes an orange precipitate which, upon agitating with ether, yields a yellow solution. This solution is decolorized upon agitating it with a dilute solution of an alkali. The addition of sodium hydroxide T.S. intensifies the color of an aqueous solution of eosin A (1 in 500). Eosin A dissolves in concentrated sulphuric acid (see page 552) with a yellow color and, when this solution is cautiously diluted with distilled water, a yellowish-red precipitate is produced.

Ether.—Use ether (see page 32). It should be neutral to moistened litmus paper.

Ether, Dehydrated, $(C_2H_5)_2O$.—Specific gravity not greater than 0.7115 at 25° C.; it distils between 34° and 36° C. Add a very small quantity of powdered rosaniline acetate (see page 546), dried at 100° C., to 10 mils of dehydrated ether, contained in a dry glass cylinder, stopper and shake it. No coloration results (*water or alcohol*). Add some dry tannic acid to 10 mils of dehydrated ether, contained in a dry glass cylinder, stopper and shake it; the tannin does not agglutinate or form a syrupy deposit (*water or alcohol*). Twenty mils of dehydrated ether, when permitted to evaporate spontaneously, leaves no perceptible residue, and upon rinsing the vessel with distilled water, the latter does not distinctly affect litmus paper. If the ether shows the presence of traces of moisture it should be shaken with pieces of anhydrous calcium chloride.

Ethyl Acetate (Acetic Ether), $CH_3.COOC_2H_5$.—A transparent, colorless liquid, of fragrant, acetous odor; inflammable; soluble in about 10 parts of water at 25°C.;

miscible in all proportions with alcohol, ether, or volatile oils. Specific gravity: 0.893 to 0.898 at 25° C.; boiling point from 72° to 77° C. On evaporating 10 mils of ethyl acetate on a water bath no weighable residue remains (*non-volatile matter*). Ethyl acetate does not immediately redden blue litmus paper. Evaporate a portion of ethyl acetate spontaneously from clean, odorless blotting paper; the final odor, after that of the ester ceases to be noticeable, is not that of foreign esters (*butylic or amylic ester*). Agitate 25 mils of ethyl acetate with 25 mils of a saturated aqueous solution of calcium chloride and permit it to stand for complete separation; the volume of the latter does not increase more than 0.5 mil (*alcohol or water*). Mix 20 mils of ethyl acetate with a solution of 20 Gm. of sodium hydroxide in 50 mils of distilled water, allow the mixture to stand, agitating occasionally, or heat it gently under a reflux condenser, until a homogeneous liquid results, and then distil about 25 mils. This distillate complies with the test for absence of methyl alcohol under *Alcohol*. When 5 mils of ethyl acetate is poured over 5 mils of sulphuric acid, no coloration is produced at the zone of contact of the two layers (*amyl alcohol or other carbonizable impurities*).

Ferric Ammonium Sulphate, $FeNH_4(SO_4)_2 + 12H_2O$.—Pale violet, octahedral crystals, without odor, and having an acid, styptic taste; efflorescent on exposure to the air. Soluble in 2.7 parts of water at 25° C. and in 0.8 part of boiling water; insoluble in alcohol. The addition of 0.5 mil of nitric acid to 10 mils of a solution of the salt (1 in 20), followed by a few drops of silver nitrate T.S., produces no turbidity (*chloride*). The addition of a few drops of a freshly prepared solution of potassium ferricyanide T.S. to a solution of the salt (1 in 20) does not produce a blue or green color (*ferrous salt*).

Ferric Ammonium Sulphate Test Solution.—Dissolve 10 Gm. of ferric ammonium sulphate in sufficient distilled water to measure 100 mils.

Ferric Chloride Test Solution.—Dissolve 10 Gm. of ferric chloride (see page 166) in sufficient distilled water to measure 100 mils.

Ferrous Sulphate Test Solution.—Dissolve a clear crystal of ferrous sulphate (see page 170) in about 10 parts of distilled water which has been previously boiled to expel air. This solution is to be freshly prepared immediately before use.

Ferrous Sulphate (Acid) Test Solution.—Dissolve 7.5 Gm. of clear crystals of ferrous sulphate (see page 170) in 90 mils of distilled water which has been previously boiled to expel air, and then add sufficient sulphuric acid (see page 24) to measure 100 mils. This solution is to be freshly prepared immediately before use.

Ferrous Sulphide, FeS.—A heavy solid, in the form of black or brownish-black irregular masses, or cast into sticks, soluble in diluted sulphuric or diluted hydrochloric acid, with copious evolution of hydrogen sulphide.

Filter Paper, Quantitative.—For the Mercuric Bromide Test Paper of the Arsenic Test use Schleicher and Schüll's No. 589 (Blue Ribbon), or Swedish O. filter paper or other makes of like surface, quality and ash (see Arsenic Test, page 584).

Fluorescein (Resorcinolphthalein).—A derivative [$C_{20}H_{12}O_5$ or $O(C_6H_3OH)_2C.C_6H_4COO$] of resorcinol obtained by the condensation of resorcinol and phthalic anhydride. Fluorescein occurs as a yellowish-red to dark-red powder; odorless and tasteless. It is very slightly soluble in water or ether, soluble in alcohol. Fluorescein dissolves in solutions of alkali hydroxides or carbonates, forming a liquid which appears red when observed in transmitted light and fluorescent bright-green in reflected light. An alkaline solution of fluorescein, even when highly diluted, shows a greenish-yellow fluorescence, which is discharged by the addition of a slight excess of acid. Incinerate 1 Gm. of fluorescein; the ash does not exceed 0.0025 Gm. Heat about 1 Gm. of fluorescein at a temperature below a red heat until it is completely carbonized, then boil the powdered residue with 10 mils of diluted hydrochloric acid for five minutes, filter and wash the residue with 10 mils of distilled water. The combined filtrate, when boiled with a few drops of nitric acid, and supersaturated with ammonia and filtered, if necessary, remains clear upon the addition of an equal volume of hydrogen sulphide T.S. (*zinc*). Shake about 1 Gm. of fluorescein with 20 mils of distilled water and filter; one drop of tenth-normal sodium hydroxide V.S. imparts to 10 mils of the filtrate a bright green fluorescence. The addition of a drop of ferric chloride T.S. to the remaining portion of the filtrate does not produce a bluish coloration (*resorcinol and various other phenolic compounds*).

Fuchsin (Basic Fuchsin, Magenta, Rubin, Rosaniline).—The hydrochloride or acetate of rosaniline (triamido-diphenyl-tolyl-carbinol) frequently with the same salts of para-rosaniline (triamido-triphenyl-carbinol). In well-developed crystals or irregular crystalline fragments of a glossy, greenish-bronze luster. Soluble in water, alcohol, or amyl alcohol. An aqueous solution (1 in 500), upon the addition of tannic acid T.S., yields a red precipitate. The addition of about 0.5 Gm. of zinc dust (see page 554), and 10 mils of ammonia water to 10 mils of an aqueous solution of fuchsin (1 in 500) produces decolorization when the mixture is well shaken. Place a few drops of this decolorized solution on filter paper, and then add near by a few drops of hydrochloric acid; the zone where the two neutralizing fluids meet assumes a red color. Sulphurous acid (see page 553), when added slowly, with agitation, to an aqueous solution of fuchsin (1 in 500) causes decolorization. The original color is restored upon the subsequent addition of a solution of formaldehyde. Upon slowly adding hydrochloric acid, to an aqueous solution of fuchsin (1 in 500), the red color gradually changes to a brownish-red which subsequently changes to a yellow when the reagent is in excess. The addition of sodium hydroxide T.S. to an aqueous solution of fuchsin (1 in 500) precipitates the red colored free base. Finely pulverized fuchsin dissolves in concentrated sulphuric acid (see page 552) with a yellow to yellowish-brown color, which solution, upon the cautious addition of distilled water, becomes yellow to colorless.

Fuchsin, Acid (Acid Magenta, Acid Rubin, Fuchsin S).—Chiefly the acid sodium salt of fuchsin di- and tri-sulphonic acids. Acid fuchsin occurs as metallic, greenish, glistening granules or as a greenish-brown crystalline powder; soluble in water, forming a cherry-red solution, very slightly soluble in alcohol; insoluble in ether. The addition of tannic acid T.S. to an aqueous solution of acid fuchsin (1 in 500) produces no precipitation (*acid color*). The addition of about 0.5 Gm. of zinc dust and 5 mils of ammonia water to 10 mils of an aqueous solution of acid fuchsin (1 in 500) produces decolorization when the mixture is well shaken. When this mixture is filtered, the addition of hydrochloric acid to the colorless filtrate restores its original red color. This solution, when agitated with ether, imparts no color to the latter (*phthaleins*). The addition of sodium hydroxide T.S. to an aqueous solution of the salt (1 in 500) almost decolorizes the solution. The addition of hydrochloric acid to an aqueous solution (1 in 500) produces no change. It dissolves in concentrated sulphuric acid with a yellow to brownish-red color and this solution, upon the cautious addition of distilled water, changes to its original fuchsin-red color.

Fuchsin-Sulphurous Acid Test Solution.—To a solution of 0.5 Gm. of fuchsin and 9 Gm. of sodium bisulphite (see page 547) in 500 mils of distilled water, add 10 mils of hydrochloric acid. The quantity of sulphurous acid present should be about 5 Gm. Preserve the solution in well-stoppered bottles protected from light.

Gelatin Test Solution.—Dissolve 1 Gm. of gelatin (see page 199) in 50 mils of distilled water, with the aid of a gentle heat, and filter if necessary. This solution is to be freshly made when wanted for use.

Glass Wool (Spun Glass).—Fine threads of spun glass. Two Gm. of glass wool when digested on a bath of boiling water for one-half hour with 100 mils of diluted hydrochloric acid, the mixture filtered and the filtrate evaporated to dryness and then dried at 110° C., leaves not more than 0.01 Gm. of residue (*soluble matter*). Boil 1 Gm. of glass wool for a few minutes with a mixture of 25 mils each of diluted nitric acid and distilled water; filter, evaporate the filtrate to dryness, and treat the residue with 10 mils of distilled water and again filter it; the filtrate is not affected by the addition of hydrogen sulphide T.S. (*lead*).

Glucose, Dry (Dextrose, d-glucose), $C_6H_{12}O_6$.—A white, anhydrous powder which complies with the tests for identity and purity given under "*Glucosum.*"

Gold Chloride (Chlorauric Acid), $AuCl_3HCl+4H_2O$.—Yellow, very hygroscopic crystals which contain about 48 per cent. of metallic gold, when assayed by moistening a weighed portion of the crystals with a slight excess of ammonium oxalate T.S., evaporating to dryness, igniting and weighing the residue. The metallic gold thus obtained does not give a positive reaction upon heating with diluted hydrochloric acid, filtering and testing the solution with either hydrogen sulphide T.S., dry glucose, or ammonium sulphide T.S.

Gold Chloride Test Solution.—Dissolve 1 Gm. of gold chloride in 30 mils of distilled water.

Gold Chloride Test Solution, Diluted.—This solution is used as a standard for the assay of Dried Suprarenals (see page 424), and must contain 0.1 Gm. of metallic gold in each 100 mils. Accurately measure 10 mils of gold chloride test solution (see above) into a weighed porcelain crucible, add about 1 Gm. of ammonium oxalate T.S. and evaporate it to dryness; then cautiously ignite the residue until no further loss in weight occurs, and weigh. Calculate the exact amount of metallic gold present in the solution which has been assayed and then dilute the remainder with a sufficient quantity of distilled water to make each 100 mils contain 0.1 Gm. of metallic gold.

Hematein, $C_{16}H_{12}O_6$.—A product of the oxidation of hematoxylin, occurring in reddish-brown plates of a greenish metallic luster; very slightly soluble in cold water, alcohol or ether, insoluble in chloroform. It is soluble in ammonia water with a brownish-violet color and in diluted solutions of the caustic alkalies with a bright red color.

Hematoxylin and Hematoxylin Test Solution.—See under *Indicators* (page 580).

Hydrated Chloral Test Solution.—A concentrated aqueous solution prepared by dissolving 3 parts of hydrated chloral (see page 107) in 2 parts of distilled water.

Hydrochloric Acid, Concentrated, for Tests, HCl.—An acid of specific gravity between 1.170 and 1.184 at 25° C. (35 to 38 per cent.), which must respond to the following tests of purity: Evaporate 100 mils of the acid to about 5 mils, dilute it with 10 mils of distilled water, and add a few drops of barium chloride T.S.; no precipitate occurs within twelve hours (*sulphuric acid*). Evaporate 50 mils of the acid to dryness on a water bath; not more than 0.002 Gm. of non-volatile residue remains (*non-volatile solids*). Add 5 mils of the concentrated acid, diluted with 50 mils of distilled water, to a solution of 1 drop of tenth-normal iodine V.S. in 50 mils of distilled water to which a few drops of starch T.S. have been added; no decolorization occurs (*sulphurous acid*). Dilute 10 mils of the acid with about 100 mils of warm distilled water (at about 50° C.) and thoroughly saturate it with hydrogen sulphide; no dark coloration or precipitate forms either before or after neutralizing with ammonia water and adding a few drops of ammonium sulphide T.S. (*heavy metals*). Two mils of the acid, diluted with 10 mils of distilled water, when subjected to the Arsenic Test (No. 1) produces a stain not greater than that produced by the zinc.

Hydrogen Sulphide, H_2S.—A gas generated by treating ferrous sulphide (see page 532) with diluted sulphuric acid, and washing the gas as directed below under the Test Solution.

Hydrogen Sulphide Test Solution (Hydrosulphuric Acid).—A saturated, aqueous solution of hydrogen sulphide. To prepare about 1000 mils of the solution, treat 20 Gm. of ferrous sulphide in a suitable apparatus with a mixture of 20 mils of sulphuric acid (see page 24) and 250 mils of distilled water, pass the gas through a drying tube filled with granulated calcium chloride, then from this through a tube of about 8 millimeters diameter and 40 centimeters in length, which contains about 5 Gm. of coarsely pulverized iodine mixed with glass wool (see page 534), and finally through a wash bottle which contains a small quantity of potassium iodide T.S. The gas thus purified is conducted nearly to the bottom of a bottle of the capacity of about 1500 mils containing 1000 mils of cold distilled water. Shake the bottle occasionally to facilitate the solution of the gas. When the gas is no longer absorbed, transfer the solution to small, dark amber-colored bottles, fill nearly to the top; pass a stream of purified hydrogen sulphide for a few minutes through each, and then at once stopper them tightly, and preserve them afterwards in a cool and dark place. Do not use this solution unless it retains a strong odor of hydrogen sulphide, and, when added to an equal volume of ferric chloride T.S. produces at once a copious precipitate of sulphur.

Indicators.—See special list, page 579.

Indigo Carmine Test Solution.—Dissolve 1 Gm. of sodium indigotindisulphonate (see page 391) in 150 mils of distilled water.

Iodeosin and Iodeosin Test Solution.—See under *Indicators* (page 580).

Iodine, Purified.—Heat powdered iodine (see page 228) in a porcelain dish placed on a water bath for twenty minutes, and stir it constantly with a glass rod, so that adhering moisture, cyanogen iodide, and most of the iodine bromide and iodine chloride, if present, may be vaporized, then transfer the iodine to a porcelain or other non-metallic mortar, and triturate it with about 5 per cent. of its weight of dry potassium iodide, so as to decompose any remaining iodine bromide and iodine chloride. Then return the mixture to the dish, cover it with a glass funnel, and heat the dish carefully on a sand bath. Detach the sublimed iodine, powder it and then dry for twenty-four hours over calcium chloride. Keep the product in well-stoppered bottles, in a cool place. One Gm. of iodine, thus purified, leaves no weighable residue when sublimed.

Iodine Test Solution.—Dissolve 1 Gm. of iodine (see page 228) and 3 Gm. of potassium iodide (see page 340) in 50 mils of distilled water.

Iodo-bromide Test Solution.—(See Iodine Absorption Value Test No. 8.) Dissolve 13.2 Gm. of powdered iodine (see page 228) in 1000 mils of glacial acetic acid (see page 7) with the aid of a gentle heat, if necessary to facilitate solution. Cool the solution to 25° C. and determine the iodine content in 20 mils of the solution by means of tenth-normal sodium thiosulphate V.S.; then add to the solution a quantity of bromine (see page 527) molecularly equivalent to that of the iodine present (3 mils being the usual approximate amount). Keep the solution in glass-stoppered bottles, protected from light.

Iron, Metallic, Fe.—Bright and perfectly clean iron in the form of wire, sheet, filings, or powder (electrolytically reduced). For making solutions of pure iron salts, fine, thin, bright wire (so-called "florist's" or "piano wire") is used. For detecting copper use bright pieces of sheet iron or steel needles.

Lævo-methylamino-ethanol-catechol, $C_9H_{13}O_3N$.—A nearly white to light brown micro-crystalline powder. Very slightly soluble in water; almost insoluble in alcohol (90 per cent.), in ether, and in chloroform. Combines with acids to form salts which are readily soluble in water and in alcohol (90 per cent.). Melts, with partial decomposition, between 205° and 212° C. Alkaline to moistened litmus paper. A dilute, slightly acidified solution gives with a trace of ferric chloride an emerald-green color which is changed to purple or carmine by the cautious addition of a dilute solution of sodium hydroxide. It readily reduces solution of gold chloride and gradually develops a characteristic, unpleasant odor when a small quantity is mixed with five times its volume of sodium hydroxide T.S. It yields no precipitate with potassio-mercuric iodide T.S. (*absence of most alkaloids*). No weighable ash is obtained on ignition of 0.2 Gm.

Lead Acetate Glass Wool.—Immerse glass wool (see page 534) in a mixture of equal parts of lead acetate T.S. and distilled water and remove the excess of liquid by pressing it between filter paper. Prepare the glass wool, as just described, immediately before it is required in the test.

Lead Acetate Test Paper.—Immerse strips of heavy white filter paper, 6 cm. in width and 8 cm. in length, in a mixture of equal parts of lead acetate T.S. and distilled water, drain off the excess of liquid and dry the paper on glass in an oven at 100° C., avoiding contact with metal.

Lead Acetate Test Solution.—Dissolve 10 Gm. of clear, transparent crystals of lead acetate (see page 328), free from adhering lead carbonate, in sufficient distilled water to measure 100 mils. Preserve the solution in well-stoppered bottles.

Lead Acetate Test Solution, Alcoholic.—Dissolve 3 Gm. of clear transparent crystals of lead acetate (see page 328), free from adhering lead carbonate, in sufficient alcohol to measure 100 mils. Preserve the solution in well-stoppered bottles.

Lead Acetate Test Solution, Basic.—Use the official solution of lead subacetate (see page 249).

Lead Nitrate, $Pb(NO_3)_2$.—Colorless, octahedral crystals, transparent or opaque. Soluble in 1.85 parts of water at 25° C., in 0.75 part of boiling water, and almost insoluble in alcohol. Lead nitrate responds to the tests of identity for lead and freedom from foreign metals directed under *Plumbi Acetas* (see page 328).

Lead Peroxide (Lead Dioxide), PbO_2.—A dark brown powder containing not less than 90 per cent. of lead peroxide. Insoluble in nitric acid; when warmed with hydrochloric acid, it is converted into lead chloride with the evolution of chlorine; when heated alone or with sulphuric acid, lead peroxide gives off oxygen. It is dissolved by concentrated solutions of potassium or sodium hydroxide. Dissolve by agitation about 0.5 Gm. of finely powdered lead peroxide, previously dried to constant weight at 100° C. and accurately weighed, in a solution of 1.5 Gm. of potassium iodide (see page 340) and 12 Gm. of sodium acetate (see page 380), in 8 mils of glacial acetic acid (see page 7) diluted with an equal volume of distilled water. Should the resulting solution be turbid, add further small portions of sodium acetate until clear. Then determine the liberated iodine by titrating with tenth-normal sodium thiosulphate V.S., starch T.S. being used as indicator. It shows not less than 90 per cent. of PbO_2. Each mil of tenth-normal sodium thiosulphate V.S. is equivalent to 0.01195 Gm. of PbO_2

Lime, Freshly Slaked.—To prepare freshly slaked lime for the Opium Assay, drop upon a convenient quantity of lime one-third of its weight of water, cover it and allow it to stand until the lime is slaked and cooled.

Litmus Paper and Test Solution.—See under *Indicators* (page 581).

Magnesia Mixture Test Solution.—Dissolve 5.5 Gm. of magnesium chloride, and 7 Gm. of ammonium chloride (see page 41) in 65 mils of distilled water, add 35 mils of ammonia water (see page 53), set the mixture aside for a few days in a well-stoppered vessel, and filter. If not perfectly clear, filter the solution before using.

Magnesium Chloride, $MgCl_2+6H_2O$.—White, deliquescent crystals, soluble in about 0.6 per cent. of cold water and about 5 parts of alcohol, leaving no insoluble residue. Ten mils of an aqueous solution (1 in 20) shows no precipitate upon the addition of a few drops of diluted sulphuric acid (*barium*), nor after the addition of 10 mils of ammonium chloride T.S. followed by a few drops of ammonia water and 5 mils of ammonium oxalate T.S. (*calcium*), nor after the addition of ammonium sulphide T.S. (*heavy metals*).

Magnesium Sulphate Test Solution.—Dissolve 10 Gm. of magnesium sulphate (see page 265) in sufficient distilled water to measure 100 mils.

Manganese Sulphate, $MnSO_4$.—Containing from 4 to 5 molecules of water of crystallization (depending on the temperature at which it is crystallized), forming pale rose-red crystals, slightly efflorescent in the air, soluble in about 1 part of water, insoluble in alcohol. Its aqueous solution (1 in 20) yields with barium chloride T.S. a white precipitate insoluble in hydrochloric acid, and with ammonium sulphide T.S. a salmon colored precipitate. Dissolve 1 Gm. of the salt in 50 mils of distilled water, add 0.5 mil of hydrochloric acid (see page 13) and a few drops of chlorine water (see page 529), boil for a few minutes and cool. On now adding 1 mil of potassium sulphocyanate T.S. to this solution no red color is produced. Dissolve 1 Gm. of the salt in 50 mils of distilled water, add about 10 mils of ammonium chloride T.S., heat to boiling, and precipitate the manganese with ammonium sulphide T.S., continuing the heating until the precipitate acquires a greenish color, then filter, evaporate the filtrate to dryness and ignite; not more than 0.5 per cent. of residue remains (*calcium, magnesium, or alkali metals*).

Manganese Sulphate Test Solution.—Dissolve 10 Gm. of manganese sulphate in 50 mils of distilled water, and add sufficient diluted sulphuric acid to make 100 mils.

Mercuric Bromide, $HgBr_2$.—White rhombic needles or prisms or lustrous scales or a granular, crystalline powder, fusing at about 325° C. and subliming without decomposition. Soluble in 200 parts of water at 25° C. and in 25 parts of boiling water; readily soluble in boiling alcohol.

Mercuric Bromide Test Paper.—Cut stiff, heavy quantitative filter paper (see Filter Paper, Quantitative, page 532) into strips 3 mm. in width and about 12 cm., in length. Immerse these strips for five minutes in alcoholic mercuric bromide T.S. (see below). Remove the excess of solution by pressing the strips between filter paper and then dry them quickly on glass in an oven heated to 100° C. Place the strips at once in a wide-mouthed bottle and stopper it securely.

Mercuric Bromide Test Solution, Alcoholic.—Dissolve 5 Gm. of mercuric bromide in 100 mils of alcohol, employing a gentle heat to facilitate solution. Keep it in glass-stoppered bottles protected from the light.

Mercuric Chloride Test Solution.—Dissolve 5 Gm. of corrosive mercuric chloride (see page 214) in sufficient distilled water to measure 100 mils.

Mercuric Nitrate Test Solution, $Hg(NO_3)_2$.—Mix 45 Gm. of nitric acid (see page 18) with 15 mils of distilled water and dissolve 40 Gm. of red mercuric oxide (see page 218) in the mixture. Keep the solution in glass-stoppered bottles.

Mercuric Potassium Iodide Test Solution (*Mayer's Reagent*).—Dissolve 1.358 Gm. of corrosive mercuric chloride (see page 214) in 60 mils of distilled water, and 5 Gm. of potassium iodide (see page 340) in 10 mils of distilled water. Mix the two solutions, and then add sufficient distilled water to measure 100 mils.

Mercuric Potassium Iodide Test Solution, Alkaline (*Nessler's Reagent*).—Dissolve 10 Gm. of potassium iodide (see page 340) in 10 mils of distilled water, and add gradually in portions a saturated aqueous solution of corrosive mercuric chloride (see page 214) with constant agitation, until a slight red precipitate remains undissolved; to this mixture add 30 Gm. of potassium hydroxide (see page 338) and, when solution has taken place, 1 mil more of the saturated aqueous solution of mercuric chloride. Dilute this solution with distilled water until it measures 200 mils. Allow the precipitate to subside, and draw off the clear fluid. Two mils of this reagent, when added to 50 mils of distilled water containing 0.05 milligramme of ammonia, produces at once a yellowish-brown coloration.

Mercurous Nitrate Test Solution, $HgNO_3$.—Mix 10 Gm. of pure mercury (see page 219) with 5 mils of nitric acid (see page 18) and 5 mils of distilled water, in a porcelain evaporating dish and set it aside for twenty-four hours in a cool, dark room. Separate and drain the crystals of mercurous nitrate, and dissolve them in 100 mils of distilled water. Preserve the solution in a dark amber-colored bottle in which a small quantity of mercury has been placed.

Methyl Orange and Methyl Orange Test Solution.—See under *Indicators* (page 581).

Methyl Red and Methyl Red Test Solution.—See under *Indicators* (page 582).

Methyl Violet 6B (Paris Violet 6B).—A mixture of penta- and hexa-methyl-pararosaniline chlorides. A very dark greenish powder which dissolves readily in water or alcohol, yielding a deep violet solution. Its solution in alcohol or chloroform has a deeper blue color than the aqueous solution. Insoluble in ether. An aqueous solution of methyl violet (1 in 500) when added drop by drop to tannic acid T.S. forms a deep blue precipitate (*basic color*). The addition of a few drops of hydrochloric acid to a mixture of about 0.5 Gm. of zinc dust and 5 mils of an aqueous solution of methyl violet (1 in 500) causes rapid decolorization. Place a few drops of this decolorized solution near a few drops of ammonia water on filter paper; the zone of contact assumes a blue color. Add hydrochloric acid slowly, drop by drop, with agitation, to an aqueous solution of the salt (1 in 500); the violet color gradually changes to blue-green, green, and finally to brownish-yellow, the solution remaining clear. Upon gradually diluting this solution with distilled water, the color changes take place in the reverse order. Add 5 mils of sodium hydroxide T.S. to 5 mils of an aqueous solution of methyl violet (1 in 500); a blue precipitate gradually forms and upon heating, the mixture becomes colorless and deposits white floccules. Concentrated sulphuric acid dissolves methyl violet with an orange to brownish-red color; upon slowly diluting this solution with distilled water, the solution assumes a brown, then green, and finally a blue color. Incinerate 1 Gm. of methyl violet; not more than 0.01 Gm. of ash remains.

Methylene Green (Mono-nitro-methylene blue, Tetra-methyl-mono-nitro-thionin-chloride), $(CH_3)_2.N.C_6H_3 : N(S)C_6H_2(NO_2).N.(CH_3)_2Cl$.—A very dark brown to gray-black powder; soluble in water and slightly soluble in alcohol, yielding greenish-blue solutions. An aqueous solution of methylene green (1 in 500) yields a precipitate upon the addition of tannic acid T.S. The addition of 0.5 Gm. of zinc dust and 5 mils of ammonia water to 10 mils of an aqueous solution of the salt (1 in 500) and warming the resulting mixture causes decolorization. Add a few drops of solution of hydrogen dioxide to the decolorized liquid, keeping the solution alkaline; a violet color is produced. The addition of hydrochloric acid to an aqueous solution of methylene green (1 in 500) produces no change; sodium hydroxide T.S. produces a violet precipitate which dissolves upon heating (distinction from *methylene blue*). Methylene green dissolves in sulphuric acid with a green color and on cautiously diluting this solution with distilled water it changes to greenish-blue.

Molybdic Acid, H_2MoO_4.—A white to yellowish-white powder, containing about 85 per cent. of molybdic anhydride (MoO_3). One Gm. of molybdic acid yields a clear solution with 10 mils of ammonia water; the addition of an equal volume of hydrogen sulphide T.S. produces a greenish-yellow color but no brownish-yellow color or precipitate (*heavy metals*). Pour a solution of 10 Gm. of molybdic acid in about 25 mils of ammonia water into a mixture of 75 parts of nitric acid (see page 18), and 75 parts of distilled water and set it aside for twelve hours at about 40° C.; no yellow precipitate appears (*phosphoric acid*). Prepare a solution of about 0.5 Gm. of molybdic acid, accurately weighed, in 50 mils of distilled water by the aid of about 3 mils of ammonia water, warming it to facilitate solution. Make this solution acid with acetic acid, dilute it further with 200 mils of distilled water, and heat to boiling; then add 30 mils of an aqueous solution (1 in 20), containing lead acetate (see page 328), cover the beaker and boil the liquid for several minutes, stirring occasionally to facilitate granulation of the precipitate. Wash the precipitate by decantation ten times, using 50 mils of boiling distilled water each time; collect the precipitate in a previously ignited and tared Gooch crucible containing a layer of asbestos (see page 525), again wash the precipitate with boiling distilled water until the washings cease to react with hydrogen sulphide T.S., and ignite to constant weight. The amount of lead molybdate ($PbMoO_4$) obtained, multiplied by 0.39226, gives the amount of molybdic anhydride (MoO_3) present.

Naphthylamine (Alpha) Hydrochloride, $C_{10}H_7.NH_2.HCl$.—A white crystalline powder which turns bluish on exposure. Soluble in water, alcohol, or ether. For tests of identity see below, under Betanaphthylamine.

Naphthylamine (Alpha) Hydrochloride Test Solution.—Boil 0.5 Gm. of alpha-naphthylamine hydrochloride with 100 mils of distilled water, for ten minutes, keeping the volume constant and finally filter it through cotton. Employ only freshly distilled water in preparing this reagent, which must be kept in well-stoppered bottles, protected from light.

Naphthylamine (Beta) Hydrochloride, $C_{10}H_7.NH_2.HCl$.—White to yellowish, glossy scales, or flakes, soluble in about 50 parts of water and readily soluble in alcohol. The addition of one drop of ferric chloride T.S. to 10 mils of an aqueous solution of betanaphthylamine hydrochloride (1 in 100) does not produce a violet color (*alpha-naphthylamine*); the addition of a small crystal of sodium nitrite to an aqueous solution of betanaphthylamine hydrochloride (1 in 100) produces an orange precipitate, not a dark red precipitate (distinction from *alpha-naphthylamine*).

Nitric Acid, HNO_3.—Use the official nitric acid (see page 18).

Nitric Acid, Diluted.—Add 50 Gm. of nitric acid (see page 18) to 290 Gm. of distilled water. It contains not less than 9.5 per cent. nor more than 10.5 per cent. of HNO_3. Diluted nitric acid to which an equal volume of distilled water has been added is not affected upon the addition of barium nitrate T.S. (*sulphuric acid*), or of silver nitrate T.S. (*hydrochloric acid*). Dilute about 20 mils of diluted nitric acid, accurately weighed, with 10 mils of distilled water and titrate with normal potassium hydroxide V.S., methyl orange T.S. being used as indicator. It shows not less than 9.5 per cent. nor more than 10.5 per cent. of HNO_3.

Nitric Acid, Fuming.—Use the commercial red fuming acid, if it is of a specific gravity between 1.48 and 1.52 at 25° C. Preserve it carefully in glass-stoppered bottles, in a cool place. It should conform to the tests for purity given under *Acidum Nitricum.*

Oil of Cedarwood (for use with the microscope).—For clearing microscopic sections, a selected commercial distilled oil from the wood of the Red Cedar, *Juniperus Virginiana* Linné (Fam. *Pinaceæ*) should be used. Such oil should have a refractive index of about 1.504 at 20° C. For use with homogeneous immersion lenses, a specially prepared oil is required, having a refractive index of exactly 1.515 at 18° C.

Orange G (The sodium salt of azo-benzene-beta-naphthol disulphonic acid), $C_6H_5.N : N.C_{10}H_4(OH)(SO_3Na)_2(2.6.8)$.—Orange to brick-red powder, or dark red crystals; readily soluble in water, yielding an orange-yellow solution, slightly soluble in alcohol, insoluble in ether or chloroform. The addition of tannic acid T.S. to an aqueous solution of orange G (1 in 500) causes no precipitation (*acid color*). The addition of hydrochloric acid to a mixture of 0.5 Gm. of zinc dust and 10 mils of an aqueous solution of the color (1 in 500) produces decolorization. When filtered, the colorless filtrate, on standing exposed to the air, does not regain its original color (presence of *azo-group*). When heated, orange G does not deflagrate (distinction from *nitro colors*). The addition of barium or calcium chloride T.S. to a concentrated aqueous solution of orange G produces a colored, crystalline precipitate. The addition of hydrochloric acid to an aqueous solution of the dye (1 in 500) produces no change; the addition of sodium hydroxide T.S. to a similar solution produces a yellowish-red to a bordeaux color but no precipitation. Orange G dissolves in concentrated sulphuric acid with an orange to yellowish-red color; no change in color results upon diluting the solution cautiously with distilled water.

Orcin (Orcinol; Dihydroxy-methyl-benzene 1.3.5.), $C_6H_3(CH_3).(OH).(OH).+H_2O$.—In the form of monoclinic prisms, white with a reddish tint, which fuse at about 58° to 60° C. Orcin has an intensely sweet and astringent taste; very soluble in hot water, less soluble in cold water, readily soluble in alcohol or ether. The anhydrous substance fuses between 106° and 108° C. Anhydrous crystals are deposited from an ether solution. When exposed to light or air the crystals assume a reddish-brown color. The addition of a few drops of ferric chloride T.S. to an aqueous solution of orcin (1 in 20) produces a deep blue color. Warm 10 mils of an aqueous solution of orcin (1 in 10) with 10 mils of sodium hydroxide T.S. and add a few drops of chloroform; the solution assumes a purple-red color then bright red, and, after diluting with distilled water, shows an intense, greenish-yellow fluorescence. Aqueous solutions of orcin (1 in 20) tested separately do not yield precipitates upon the addition of test solutions of either mercuric chloride, cupric sulphate, tannic acid or lead acetate; with basic lead acetate T.S., a white precipitate is obtained (characteristic of *resorcinol derivatives*). Dissolve about 1.3 Gm. of orcin, accurately weighed, in sufficient distilled water to measure 1000 mils. Introduce 25 mils of this solution, 25 mils of tenth-normal bromine V.S. and 50 mils of distilled water into a glass-stoppered flask of about 300 mils capacity, and then add 25 mils of dilute sulphuric acid T.S. After thoroughly agitating the mixture, set it aside for ten minutes, then cautiously lift the stopper, quickly introduce 2 Gm. of potassium iodide and close the flask at once. Agitate the solution and, after five minutes, determine the liberated iodine by means of tenth-normal sodium thiosulphate V.S.; conduct a blank experiment, omitting the addition of the solution of orcin and note the number of mils of tenth-normal sodium thiosulphate V.S. consumed. The difference in mils of tenth-normal sodium thiosulphate V.S. required in the original titration and the blank test, when multiplied by 0.002068, gives the quantity of anhydrous orcin present, which corresponds to not less than 85 per cent.

Ouabain.—Crystallized ouabain, frequently, though erroneously, referred to as crystallized strophanthin, or g-strophanthin Thoms. Ouabain is a glucoside, $C_{30}H_{46}O_{12}+9H_2O$, obtained from the wood of *Acocanthera Ouabaio* Cathelineau, or from the seed of *Strophanthus gratus* Franchet. It occurs as colorless, quadratic crystals of bitter taste. It is easily soluble in hot water, soluble in 100 parts of cold water and in about 30 parts of dehydrated alcohol and in 30 parts of amyl alcohol; slightly soluble in acetic ether, ether or chloroform. A solution of 0.01 Gm. of ouabain in 1 mil of distilled water, poured over a layer of concentrated sulphuric acid colors the latter from pink to red and the aqueous layer is colored green. Heated to 105° C. it loses about 20 per cent. of water. The ouabain thus dried melts between 187° and 188° C. On igniting 0.2 Gm. no weighable ash remains. Heating with diluted hydrochloric or sulphuric acid produces hydrolytic cleavage, yielding a body which is identical with rhamnose.

Oxalic Acid, Purified, $H_2C_2O_4+2H_2O$.—Colorless, uneffloresced crystals, soluble in 10 parts of cold water, in about 3 parts of boiling water and in 2.5 parts of alcohol. Ten Gm. when ignited leaves not more than 0.005 Gm. of residue (*non-volatile matter*). Dissolve 2 Gm. of oxalic acid and about 3 Gm. of potassium hydroxide in 30 mils of distilled water, add to this solution about 15 drops of Nessler's Reagent (see page 538), no brownish-red coloration develops when compared with a blank test, omitting the oxalic acid (*ammonium compound*). Preserve it in well-stoppered bottles.

Oxalic Acid Test Solution.—Dissolve 5 Gm. of purified oxalic acid (see above) in sufficient distilled water to measure 100 mils.

Palladous Chloride, $PdCl_2$.—A dark brown, hygroscopic mass, readily soluble in water.

Palladous Chloride Test Solution.—Dissolve 0.5 Gm. of palladous chloride in sufficient distilled water to measure 10 mils. Preserve the solution in a glass-stoppered bottle.

Paradimethylaminobenzaldehyde (Dimethyl-p-amino-benzaldehyde), $(CH_3)_2N.C_6H_4.CHO$.—Colorless scales fusing at 73° C.; soluble in hot water. The addition of an alcoholic solution of benzidine (1 in 100) to a slightly acidified solution of paradimethylaminobenzaldehyde produces a brick-red precipitate after standing.

Peptone (Beef Peptone).—The dried product of the pancreatic digestion of meat. A yellow powder of a slightly bitter but not disagreeable taste and an odor resembling that of meat extract. Soluble in all proportions in water, yielding a yellowish-brown liquid of faintly acid reaction. Slightly soluble in diluted alcohol, insoluble in alcohol or ether. An aqueous solution of peptone (1 in 20), upon the addition of tannic acid T.S. or mercuric chloride T.S., yields a precipitate. On the addition of 0.5 mil of potassium hydroxide T.S. to an aqueous solution of peptone (1 in 20), followed by a solution of copper sulphate (1 in 50), added drop by drop with agitation, an intense, red-violet color is produced (biuret reaction). Pour an aqueous solution of peptone (1 in 20) into an excess of alcohol, allow the resulting precipitate to settle and decant the clear supernatant liquid; the residue left on evaporating this liquid is completely soluble in alcohol and no coagulation occurs. One Gm. of peptone dissolves in 20 parts of water with but slight turbidity. When an aqueous solution of peptone (1 in 200) is heated to boiling, no precipitation occurs; the addition of nitric acid does not cause turbidity (*coagulable albumin*). Saturate an aqueous solution of peptone (0.5 Gm. in 20 mils) with powdered zinc sulphate; not more than a slight flocculent precipitate appears (*proteoses*). Dry 1 Gm. of peptone at 100° C.; it loses not more than 7 per cent. in weight; ignite this dried product; not more than 0.005 Gm. of ash remains. Peptone contains not less than 12.5 per cent. of nitrogen when determined by the Kjeldahl method, corresponding to about 78 per cent. of pure peptone.

Phenoldisulphonic Acid Test Solution (Phenol-disulphonic acid), $C_6H_3(OH)(SO_3H)_2$.—Mix 37 parts of sulphuric acid (see page 24) with 3 parts of phenol (see page 316) in a flask of suitable capacity and heat in a bath of boiling water for six hours. Transfer the product to a glass-stoppered bottle while still fluid, and when desired for use, warm on a water bath until liquefied.

Phenolphthalein Test Solution.—See under *Indicators* (page 582).

Phenylhydrazine, $C_6H_5.NH.NH_2$.—A colorless, or slightly yellowish, highly refractive liquid, boiling between 241° and 243° C.; congealing, when cold, to monoclinic plates fusing at about 19° C. Phenylhydrazine is slightly soluble in cold water, more soluble in hot water and readily soluble in alcohol or ether. Its solutions rapidly absorb oxygen from the air, becoming brown. Shake 2 mils of phenylhydrazine with 20 mils of 5 per cent. acetic acid; a clear solution results.

Phenylhydrazine Dihydrochloride, $C_6H_5NH.NH_2.2HCl$.—A white crystalline powder, readily soluble in water, but slowly soluble in alcohol. It melts at about 200° C. Add to an aqueous solution of phenylhydrazine dihydrochloride (1 in 10) sufficient sodium hydroxide T.S. until the reaction is alkaline; upon the addition of copper sulphate T.S., a dense red precipitate is formed. An aqueous solution of the salt (1 in 20) has an acid reaction and is clear and colorless. One Gm. of the salt when ignited leaves no weighable residue.

Phenylhydrazine Hydrochloride, $C_6H_5.NH.NH_2.HCl$.—Silky scales melting at about 225° C. Readily soluble in water or alcohol. Its aqueous solution is clear and free from suspended particles.

Phloroglucinol, $C_6H_3(OH)_3+2H_2O$.—A white to cream colored crystalline powder, readily soluble in water, alcohol, or ether. When rapidly heated, it melts between 217° and 219° C., or when slowly heated, between 200° and 209° C. Introduce a few crystals of phloroglucinol in a test tube with about 1 mil each of sulphuric acid and acetic anhydride and heat in boiling water for from five to ten minutes; no blue color develops (*diresorcinol*).

Phloroglucinol Test Solution.—Prepare a 3 per cent. solution of phloroglucinol in alcohol. Keep the solution protected from light.

Phosphotungstic Acid, $P_2O_5.24Wo_3+xH_2O$.—White to yellowish-green crystals efflorescing slightly in air. Readily soluble in water or alcohol and slightly soluble in ether. To a solution of 1 Gm. of phosphotungstic acid in 10 mils of distilled water, add 0.1 Gm. of sodium chloride and about 3 drops of indigo T.S. followed by about 10 mils of sulphuric acid, cautiously added; then allow the liquid to stand for ten minutes, the blue color does not disappear (*nitrate*). When 1 Gm. of phosphotungstic acid is dissolved in 10 mils of distilled water and boiled, and a small piece of sodium hydroxide added (about 2 Gm.) and the solution warmed, ammonia is not evolved (*ammonium salts*).

Picric Acid Test Solution.—See page 553.

Platinic Chloride (Chloroplatinic Acid), $H_2PtCl_6+6H_2O$.—A brownish-red, hygroscopic, crystalline mass, soluble in water, alcohol, or ether, with a yellow color. One Gm. is completely soluble in 10 mils of dehydrated alcohol. Its aqueous solution should be yellow and not brownish. When platinic chloride is strongly ignited in a porcelain crucible, not less than 37.6 per cent. of residue remains. Digest this residue with about ten times its weight of a mixture of five volumes of nitric acid and ten volumes of distilled water on a water bath for fifteen minutes, filter, evaporate to dryness and ignite to constant weight; a residue not exceeding 0.15 per cent. of the platinic chloride taken remains (*other metals*).

Platinic Chloride Test Solution.—Dissolve 2.6 Gm. of platinic chloride in 20 mils of distilled water.

Potassio-Mercuric Iodide Test Solution.—See page 538.

Potassium Bitartrate, $KHC_4H_4O_6$.—Purify potassium bitartrate (see page 332), to render it suitable for standardizing volumetric solutions of potassium and sodium hydroxide, as follows: To 100 Gm. of the salt, contained in a beaker, add a mixture of 85 mils of distilled water and 25 mils of diluted hydrochloric acid; place the covered beaker on a water bath and digest the mixture, with occasional stirring for three hours. Quickly cool the mixture, drain the solution from the precipitate, wash the latter by affusion and decantation with two successive portions of 100 mils each of distilled water, collect the precipitate on a plain filter, and continue the washing with cold distilled water until the filtrate, after adding a few drops of nitric acid, ceases to become opalescent upon the addition of silver nitrate T.S. Then dissolve the precipitate of potassium bitartrate in the smallest possible volume of boiling distilled water (about 1500 mils), filter, and constantly stir the filtrate while being rapidly cooled. When the mixture is cold, collect the crystalline precipitate on a plain filter, wash it with 300 mils of cold distilled water, and, after thoroughly draining, dry it at 120° C. until of constant weight. Preserve it in dry, securely stoppered bottles. Purified potassium bitartrate is employed for standardizing normal and tenth-normal potassium and sodium hydroxide V.S.

Potassium Bromate, $KBrO_3$.—White cubical crystals or a granular crystalline powder, having a pungent, saline taste. Soluble in 15.5 parts of water at 25° C., and in 2 parts of boiling water, slightly soluble in alcohol. An aqueous solution has a neutral reaction, and does not at once produce a yellow color upon the addition of diluted sulphuric acid (*bromide*). When heated to 350° C., the salt undergoes decomposition with the evolution of oxygen. Potassium bromate should not be triturated or heated with organic or easily oxidizable substances. The addition of nitric acid or sulphuric acid to the salt causes decomposition with the evolution of bromine. Dissolve 0.1 Gm. of potassium bromate, dried at 100° C., and 3 Gm. of potassium iodide, in about 25 mils of distilled water contained in a glass-stoppered bottle of suitable size, and, after the addition of 5 mils of hydrochloric acid, stopper the bottle securely, and set it aside for ten minutes. Not less than 35.85 mils of tenth-normal sodium thiosulphate V.S. is required to discharge the color, corresponding to 99.8 per cent. of $KBrO_3$.

Potassium Carbonate Test Solution.—Heat about 15 Gm. of potassium carbonate (see page 334) in a crucible, gradually raising the temperature to 130° C., cool it in a desiccator, weigh off 10 Gm. of the residue, and dissolve it in sufficient distilled water to measure 100 mils.

Potassium Chromate, K_2CrO_4.—Yellow rhombic crystals, soluble in 1.6 parts of water, insoluble in alcohol. Add a few drops of silver nitrate T.S. to 10 mils of an aqueous solution of the salt (1 in 10) followed by 10 mils of nitric acid, and warm to about 50° C.; no turbidity appears (*chloride*). Another 10 mils of a solution of the same strength when mixed with an equal volume of diluted hydrochloric acid does not become turbid after the addition of barium chloride T.S. (*sulphate*). Ten mils of an aqueous solution of salt (1 in 10) does not become turbid upon the addition of 5 mils of ammonia water, followed by 2 mils of ammonium oxalate T.S. (*alkali earths*). A solution of 0.1 Gm. of the salt in 20 mils of distilled water does not become red upon the addition of a few drops of phenolphthalein T.S. (*free alkali*).

Potassium Chromate Test Solution.—Dissolve 10 Gm. of potassium chromate in sufficient distilled water to measure 100 mils.

Potassium Dichromate, Purified (Potassium Bichromate), $K_2Cr_2O_7$.—This salt must conform to the following tests before it can be used in the preparation of the tenth-normal volumetric solution: To a solution of 5 Gm. of the salt in 100 mils of distilled water, add 30 mils of concentrated hydrochloric acid (see page 534), followed by 5 mils of barium chloride T.S.; no turbidity appears after standing twelve hours (*sulphate*). To a solution of 5 Gm. of the salt in 60 mils of distilled water add 1 mil of ammonium chloride T.S. followed by ammonia water until alkaline (about 10 mils) and boil the liquid; no precipitation takes place after standing twelve hours (*aluminum*). The further addition of ammonium oxalate T.S. to the solution, which should still be alkaline, produces neither turbidity nor the slightest precipitation after standing twelve hours (*alkali earths*). Add 10 mils of nitric acid to a solution of 1 Gm. of the salt in 20 mils of distilled water and heat it to about 50° C.; no turbidity develops within five minutes after the addition of a few drops of silver nitrate T.S. (*chloride*).

Potassium Dichromate Test Solution.—Dissolve 10 Gm. of purified potassium dichromate in sufficient distilled water to measure 100 mils.

Potassium Ferricyanide, $K_3Fe(CN)_6$.—Dark red crystals soluble in about 2.5 parts of cold water and in 1.5 parts of boiling water. Its aqueous solution undergoes decomposition upon standing, hence its solutions must be freshly made when required for use. Potassium ferricyanide when added to ferrous salts yields a blue precipitate (Turnbull's Blue); when added to solutions of ferric salts it yields clear brown solutions.

Potassium Ferricyanide Test Solution.—Dissolve 1 part of potassium ferricyanide in about 10 parts of distilled water. This solution should be freshly made when required, as it undergoes decomposition with formation of ferrocyanide on standing. A freshly prepared aqueous solution mixed with ferric chloride T.S. which has been well diluted with distilled water shows a brown tint, free from turbidity or a shade of green.

Potassium Ferrocyanide, $K_4Fe(CN)_6+3H_2O$.—Yellow, soft, transparent crystals which are slightly efflorescent on exposure to air. Readily soluble in hot or cold water, insoluble in alcohol. A freshly prepared aqueous solution of the salt (1 in 20) is neutral to litmus; such a solution yields a blue precipitate with solutions of ferric salts, a reddish-brown precipitate with copper sulphate T.S., and a white precipitate with lead acetate T.S. or silver nitrate T.S.

Potassium Ferrocyanide Test Solution.—Dissolve 10 Gm. of potassium ferrocyanide in sufficient distilled water to measure 100 mils.

Potassium Hydroxide Test Solution.—Use the official solution of potassium hydroxide (see page 338).

Potassium Hydroxide Test Solution, Alcoholic.—Use the half-normal alcoholic potassium hydroxide V.S. (see page 567).

Potassium Hydroxide Test Solution, Special.—This solution is to be prepared of the same strength as *Liquor Potassii Hydroxidi*, employing potassium hydroxide which, in addition to the tests prescribed under *Potassii Hydroxidi*, complies with the following: Dissolve 1 Gm. of the potassium hydroxide in 20 mils of distilled water, in a test tube about 2 cm. in diameter, add 5 mils of nitric acid, followed by a few drops of silver nitrate T.S.; not more than a slight opalescence is produced.

Potassium Iodide Test Solution.—Dissolve 20 Gm. of potassium iodide (see page 340) in sufficient distilled water to measure 100 mils, and preserve the solution in dark, amber-colored, well-stoppered bottles. The solution should be frequently renewed.

Potassium Nitrate, KNO_3.—In addition to the tests prescribed for *Potassii Nitras* (see page 341), this salt, for use as a reagent, must conform to the following tests: To a solution of 1 Gm. of potassium nitrate in 20 mils of distilled water, add 1 mil of nitric acid followed by a few drops of silver nitrate T.S.; no opalescence results (*chloride*). To a solution of 2 Gm. of the salt in 50 mils of distilled water, add 1 mil of hydrochloric acid, followed by barium chloride T.S.; no precipitate forms after standing for several hours (*sulphate*).

Potassium Permanganate Test Solution, $KMnO_4$.—Use the tenth-normal potassium permanganate V.S. (see page 568).

Potassium Sulphate, K_2SO_4.—Hard, colorless, transparent prisms, or a white powder, odorless and having a somewhat bitter saline taste; permanent in the air. Soluble in about 9 parts of water at 25° C., and in 4 parts of boiling water. A saturated aqueous solution of the salt, which is neutral to litmus, yields a white, crystalline precipitate with an excess of sodium bitartrate T.S. An aqueous solution of the salt (1 in 20) yields with barium chloride T.S. a heavy white precipitate, insoluble in hydrochloric acid. An aqueous solution of potassium sulphate (1 in 20), slightly acidulated with hydrochloric acid, does not respond to the Test for heavy metals (see Test No. 3). Five mils of an aqueous solution of the salt (1 in 30) does not exceed the limit for arsenic when subjected to the Test for arsenic (see Test No. 1).

Potassium Sulphate Test Solution.—Dissolve 1 Gm. of potassium sulphate in sufficient distilled water to measure 100 mils.

Potassium Sulphocyanate (Potassium Thiocyanate), KCNS.—Colorless, hygroscopic, prismatic crystals. Readily soluble in less than its own weight of water; soluble in 10 parts of boiling dehydrated alcohol, yielding a clear solution. An aqueous solution of the salt (1 in 20) does not become turbid upon the addition of a few drops of concentrated hydrochloric acid (see page 534), followed by barium chloride T.S. (*sulphate*). An aqueous solution of the salt (1 in 20), after the addition of 1 mil of diluted hydrochloric acid, remains colorless (*iron*), and does not respond to the Test for heavy metals (see Test No. 3).

Potassium Sulphocyanate Test Solution.—Use the tenth-normal potassium sulphocyanate V.S. (see page 570).

Pyrogallol Test Solution, Alkaline.—Dissolve 0.5 Gm. of pyrogallol (see page 348) in 2 mils of distilled water and 12 Gm. of potassium hydroxide (see page 338) in 8 mils of distilled water. Mix the solutions immediately before using.

Resorcinol Test Solution.—Dissolve 1 Gm. of resorcinol (see page 360) in sufficient concentrated hydrochloric acid (see page 534) to make 100 mils.

Rosaniline Acetate, $C_{19}H_{18}N_3.C_2H_4O_2$.—The acetate of rosaniline (see *Fuchsin*, page 533). Rosaniline acetate complies with all of the tests of identity and purity given under *Fuchsin*.

Rosolic Acid and Rosolic Acid Test Solution.—See under *Indicators* (page 582).

Sawdust, Purified.—Moisten 1000 Gm. of oak sawdust, in approximately No. 20 powder, with water, pack in a cylindrical percolator and pour on enough of a 1 per cent. solution of sodium hydroxide to saturate the powder and leave a stratum above it.

When the liquid drops from the percolator, close the lower orifice and macerate the sawdust during twenty-four hours. Then proceed to percolate slowly until the alkaline percolate measures 5000 mils. Now continue the percolation with 4000 mils of 1 per cent. hydrochloric acid and then with water until the acid is all removed and the percolate is neutral. Finally dry the powder.

Selenous Acid, H_2SeO_3.—Colorless, prismatic or granular crystals, efflorescent in dry air and hygroscopic in moist air; readily soluble in water or alcohol. Red amorphous selenium is precipitated from aqueous solutions of selenous acid upon the addition of stannous chloride T.S. or sulphurous acid.

Silver Ammonium Nitrate Test Solution.—Dissolve 1 Gm. of silver nitrate (see page 61) in 20 mils of distilled water, and add ammonia water, drop by drop, agitating the mixture, until the precipitate first produced is almost, but not entirely, redissolved. Filter the solution and preserve it in dark amber-colored and well-stoppered bottles.

Silver, Metallic, Ag.—In the form of foil, wire or powder. Dissolve 2 Gm. of the metal in the smallest possible quantity of nitric acid (see page 18) previously mixed with an equal volume of distilled water; no residue remains and the solution, after warming to remove the oxides of nitrogen, and diluting with fifty volumes of distilled water, remains colorless and clear. Add sufficient hydrochloric acid to this solution heated to boiling to precipitate the silver, filter, evaporate the filtrate to dryness and gently ignite the residue; not more than 0.0005 Gm. of residue remains (*foreign metals*), allowance being made for the non-volatile matter present in the water, reagents and extracted from the filter paper.

Silver Nitrate Test Solution.—For ordinary purposes, use the tenth-normal silver nitrate V.S. (see page 571).

Silver Sulphate, Ag_2SO_4.—Small, white, anhydrous, lustrous rhombic crystals soluble in about 87 parts of cold water. It should correspond to the tests for purity given under *Argenti Nitras* (see page 61).

Silver Sulphate Test Solution.—Mix 1 Gm. of silver sulphate with 100 mils of distilled water in a glass-stoppered bottle and shake the mixture thoroughly. Decant the clear liquid when required for use. Alternative process: Dissolve 1 Gm. of silver nitrate (see page 61) in 0.5 mil of warm distilled water, and add 1.5 mils of sulphuric acid (see page 24); on cooling, small transparent crystals of silver sulphate, Ag_2SO_4, separate. Pour off the acid liquid carefully, wash the crystals repeatedly by decantation with cold distilled water, transfer them to a bottle, add 100 mils of distilled water, and shake thoroughly until the liquid is saturated. For use, decant a sufficient quantity of the solution.

Sodium Acetate, Anhydrous, CH_3COONa.—Heat sodium acetate (see page 380) gently in a porcelain dish until fusion takes place and the salt becomes a pasty mass, then gradually increase the temperature, with caution, stirring constantly, until it again fuses, and continue the heat until a dry powder results. Care must be taken to avoid charring and the salt must be constantly stirred to prevent the adhesion of the mass to the sides of the dish.

Sodium Acetate Test Solution.—Dissolve 10 Gm. of sodium acetate (see page 380) in sufficient distilled water to measure 100 mils.

Sodium Bisulphite, $NaHSO_3$.—It contains not less than 90 per cent. of $NaHSO_3$. Opaque, prismatic crystals, or a granular powder, having the odor of sulphur dioxide, and a disagreeable, sulphurous taste. Exposed to the air, the salt loses sulphur dioxide, and is gradually oxidized to sulphate. Soluble in 3.5 parts of water, and in 70 parts of alcohol at 25° C. Dissolve 1 Gm. of sodium bisulphite in 10 mils of diluted nitric acid and heat the solution sufficiently to expel the gases; the liquid does not become turbid (*thiosulphate*). Dissolve 1 Gm. of the salt in 20 mils of diluted hydrochloric acid, and heat it sufficiently to expel the sulphur dioxide; the remaining solution, after being restored to its original volume, does not respond to the Test for heavy metals (see Test No. 3). Transfer about 0.2 Gm. of sodium bisulphite, accurately weighed, to a glass-stoppered flask containing 50 mils of tenth-normal iodine V.S., and allow to stand with occasional agitation, until the salt is dissolved. Then titrate the excess of iodine with tenth-normal sodium thiosulphate V.S. It shows not less than 90 per cent. of $NaHSO_3$. Each mil of tenth-normal iodine V.S. corresponds to 0.005204 Gm. of $NaHSO_3$.

Sodium Bisulphite Test Solution.—Dissolve 30 Gm. of sodium bisulphite in sufficient distilled water to measure 100 mils. Should the solution possess a strong odor of sulphur dioxide, add a 20 per cent. aqueous solution of sodium hydroxide, drop by drop, until the odor becomes scarcely perceptible. The solution must be freshly prepared when needed.

Sodium Bitartrate, $NaHC_4H_4O_6 + H_2O$.—White rhombic crystals or powder, soluble in 9 parts of cold and 1.8 parts of boiling water. When assayed and tested as directed under *Potassii Bitartras* (see page 332), it complies with the standards of purity there required. One mil of normal potassium hydroxide V.S. corresponds to 0.19006 Gm. of sodium bitartrate ($NaHC_4H_4O_6 + H_2O$).

Sodium Bitartrate Test Solution.—Dissolve about 9 Gm. of sodium bitartrate in 100 mils of distilled water. Alternative method: To a solution of 3.5 Gm. of tartaric acid (see page 27) in about 80 mils of boiling distilled water, add gradually in small portions monohydrated sodium carbonate (see page 386) until the solution has a neutral reaction to litmus paper. To the solution add 3.5 Gm. of tartaric acid, filter, and add sufficient distilled water to make the solution measure 100 mils. This solution must be freshly prepared when required.

Sodium Carbonate.—Use monohydrated sodium carbonate (see page 386).

Sodium Carbonate, Anhydrous, Na_2CO_3.—This is prepared from sodium bicarbonate (see page 383) which, in addition to the official requirements for purity, must conform to the following more rigorous tests before it can be employed for standardizing volumetric solutions of hydrochloric and sulphuric acids.

To a filtered solution of 5 Gm. of sodium bicarbonate in 100 mils of distilled water add an excess (5 mils) of concentrated hydrochloric acid (see page 534), heat it to boiling, and then add 1 mil of barium chloride T.S. No cloudiness or precipitate forms within twelve hours (*sulphate*). To a solution of 1 Gm. of the bicarbonate in 30 mils of distilled water add 3 mils of nitric acid (see page 18); the solution remains clear, now heat it to boiling, and add 1 mil of silver nitrate T.S.; no opalescence appears within fifteen minutes (*chloride*). To 10 Gm. of sodium bicarbonate and about 50 mils of distilled water contained in a beaker of about 250 mils capacity, add slowly with stirring, about 30 mils of concentrated hydrochloric acid (see page 534), taking care to avoid loss through violent effervescence. Filter, wash the beaker and filter with distilled water, transfer the filtrate and washings to a platinum dish, evaporate to dryness on a water bath and dry the residue for four hours at 120° C. Now add to the dried residue about 20 mils of distilled water and about 5 mils of concentrated hydrochloric acid (see page 534), again evaporate to dryness and dry as before. Finally dissolve the residue in 3 mils of concentrated hydrochloric acid (see page 534) and 50 mils of distilled water; the resulting solution remains perfectly clear upon standing (*silica*). To a solution of 1 Gm. of the bicarbonate in 15 mils of distilled water, add 2 mils of concentrated hydrochloric acid (see page 534) followed by 2 drops of nitric acid (see page 18) and boil the solution; it is not reddened upon the addition of potassium sulphocyanate T.S., a blank test being carried out at the same time (*iron*).

Take any suitable quantity of sodium bicarbonate complying with the foregoing tests, place it in a platinum vessel and heat it in an air or sand bath for one-half hour at from 270° to 280° C. (not over 300° C.). Finally cool the salt in a desiccator and before it is quite cold, transfer it to a dry, glass-stoppered bottle.

Sodium Carbonate Test Solution.—Dissolve 10 Gm. of monohydrated sodium carbonate (see page 386) in sufficient distilled water to measure 100 mils.

Sodium Chloride, NaCl.—In addition to the requirements and tests prescribed for this salt under *Sodii Chloridum* (see page 387), it is required to conform to the following more rigorous tests before it can be used in the preparation of tenth-normal sodium chloride V.S. To a solution of 3 Gm. of sodium chloride in 80 mils of distilled water, add 1 mil of concentrated hydrochloric acid (see page 534), heat it to boiling, and add about 5 mils of barium chloride T.S.; no precipitation of barium sulphate takes place within twenty-four hours (*sulphate*). To a solution of 3 Gm. of sodium chloride in about 10 mils of distilled water, add 5 mils of ammonia water and 5 mils of sodium phosphate T.S.; no precipitation takes place within twelve hours (*magnesium salts*). Dissolve 5 Gm. of the salt in 80 mils of distilled water, heat the solution to boiling, and add 5 mils of ammonium oxalate T.S.; no precipitate is produced within twelve hours (*calcium*); nor is this solution affected by the addition of sodium carbonate T.S.; nor is a freshly prepared solution of the same concentration affected by the addition of sodium sulphide T.S. (*alkali earths and heavy metals*). To a solution of 1 Gm. of sodium chloride in 10 mils of distilled water, add 5 mils of sodium cobaltic nitrite T.S.; no precipitation occurs after twenty-four hours (*potassium*). The addition of Nessler's Reagent (see page 538) to a solution of 3 Gm. of sodium chloride produces no yellow coloration (*ammonium salts*).

Sodium Cobaltic Nitrite Test Solution.—Dissolve 4 Gm. of cobaltous chloride (see page 530) and 10 Gm. of sodium nitrite (see page 393) in about 50 mils of distilled water, add 2 mils of acetic acid (see page 6) and dilute with sufficient distilled water to measure 100 mils. A few drops of acetic acid should be added to the solution from time to time. The reagent must not be kept longer than three months. Should any precipitate form on standing, filter the solution.

Sodium Cyanide Test Solution.—Dissolve 1 Gm. of sodium cyanide (see page 388) in sufficient distilled water to measure 10 mils. This solution must be freshly prepared when required.

Sodium Hydroxide Test Solution, NaOH.—Use the official solution of sodium hydroxide (see page 255).

Sodium Hypobromite Test Solution.—To a solution of 40 Gm. of sodium hydroxide (see page 390) in about 150 mils of distilled water add 10 mils of bromine (see page 527) and, after solution has taken place, add sufficient distilled water to measure 200 mils. This solution must be freshly prepared when required for use.

Sodium Nitroprusside, $Na_2Fe(NO)(CN)_5 + 2H_2O$.—Transparent, dark red rhombic crystals, soluble in about 2.5 parts of water. With soluble sulphides it gives an intense, violet coloration. Solutions of sodium nitroprusside must be freshly prepared when required for use.

Sodium Nitroprusside Test Solution.—Dissolve 1 part of sodium nitroprusside in 19 parts of distilled water immediately before using.

Sodium Oxalate, $Na_2C_2O_4$.—A white crystalline powder, 1 Gm. of which dissolves in about 34 mils of water at 25° C., and about 16 mils of boiling water. When used for the standardization of tenth-normal potassium permanganate V.S., sodium oxalate should comply with the following tests for purity and be dried to constant weight at 105° C. When dried to constant weight at 105° C., sodium oxalate loses not more than 0.03 per cent. in weight (*moisture*). Introduce into a conical Jena or other flask of like quality 2 Gm. of sodium oxalate, add 150 mils of distilled water and 0.2 mil of phenolphthalein T.S., boil until the volume is reduced to about 100 mils, then cool while passing a current of air free from carbon dioxide through the solution. If the solution is red, not more than 0.2 mil of fiftieth-normal sulphuric acid V.S. is required to render it colorless. If the solution is colorless, not more than 0.2 mil of fiftieth-normal potassium hydroxide V.S. is required to produce a pink color. Sodium oxalate yields an almost perfectly clear solution and contains not more than 0.01 per cent. of matter insoluble in water. Convert 10 Gm. of the salt into carbonate by ignition in a platinum crucible using an alcohol burner, dissolve the residue in distilled water by the aid of sufficient nitric acid to impart a distinctly acid reaction, heat to boiling, filter and divide into two parts. To one part, add barium nitrate T.S. and set aside for twelve hours; not more than a barely perceptible cloudiness results (*sulphate*). The remaining portion, after the addition of silver nitrate T.S., does not yield more than a faint opalescence (*chloride*). Ignite 5 Gm. of the salt to carbonate, dissolve the residue in distilled water, acidify with acetic acid and filter; after the addition of a few drops of sodium cobaltic nitrite T.S. to the filtrate it should not yield more than a faint trace of precipitate after standing for several hours (*potassium*). Ignite 5 Gm. of the salt, dissolve the residue in distilled water, acidify with hydrochloric acid and filter; the filtrate does not yield a coloration upon the addition of potassium sulphocyanate T.S. (*iron*). Heat 1 Gm. of the salt in a test tube, which has previously been rinsed with sulphuric acid, with 10 mils of sulphuric acid until fumes of sulphur trioxide appear; no discoloration of the acid is produced (*foreign organic bodies*).

Sodium Phosphate Test Solution.—Dissolve 10 Gm. of sodium phosphate, in clear crystals (see page 395), in sufficient distilled water to measure 100 mils.

Sodium Phospho-tungstate Test Solution (Sodium Phospho-wolframate).—To a solution of 20 Gm. of sodium tungstate in 100 mils of water, add sufficient phosphoric acid (see page 21) to impart a strong acid reaction, filter and preserve it in an amber-colored, glass-stoppered bottle. Decant the solution from any sediment which may form.

Sodium Sulphide, $Na_2S + 9H_2O$.—Colorless, or nearly colorless, transparent crystals, of sulphuretted odor, readily soluble in water, yielding a clear solution which is alkaline to litmus.

Sodium Sulphide Test Solution.—Dissolve 10 Gm. of sodium sulphide in sufficient distilled water to measure 100 mils; filter the solution if necessary. Sodium sulphide T.S. may be used in all instances where ammonium sulphide T.S. is directed, but must be freshly prepared when required for use.

Sodium Tartrate, Neutral, $Na_2C_4H_4O_6 + 2H_2O$.—Transparent crystals soluble in 2.6 parts of water at 25° C.; insoluble in alcohol. It complies with the standards for purity required under *Potassii et Sodii Tartras* (see page 337); each mil of half-normal sulphuric acid V.S. corresponds to 0.057515 Gm. of $Na_2C_4H_4O_6 + 2H_2O$.

Sodium Tartrate Test Solution.—Dissolve 10 Gm. of neutral sodium tartrate (see above) in sufficient distilled water to measure 100 mils. Alternative method: To a hot solution of 6.5 Gm. of tartaric acid (see page 27) in about 80 mils of boiling distilled water, add gradually, in small portions, monohydrated sodium carbonate (see page 386) until the solution has a neutral reaction to litmus paper; after filtering and cooling, add sufficient distilled water to measure 100 mils.

Sodium Thiosulphate, $Na_2S_2O_3 + 5H_2O$.—In addition to the tests prescribed for this salt under *Sodii Thiosulphas* (see page 400) it is required to conform to the following more rigorous tests before it can be used in preparing the standard volumetric solution. Add iodine T.S., drop by drop, to a solution of the salt (1 in 20) in distilled water until it retains a faint but permanent yellow color; no turbidity is produced upon the addition of barium chloride T.S. (*sulphate and sulphite*). The addition of phenolphthalein T.S. to 10 mils of an aqueous solution of the salt (1 in 10) produces no pink coloration (*free alkalies*).

Sodium Thiosulphate Test Solution.—Use tenth-normal sodium thiosulphate V.S. (see page 574).

Sodium Tungstate (Sodium Wolframate), $Na_2WO_4 + 2H_2O$.—Colorless prisms or plates, soluble in about 4 parts of water, forming a solution which is alkaline to litmus. Evaporate a solution of 1 Gm. of sodium tungstate in 10 mils of distilled water and 10 mils of concentrated hydrochloric acid (see page 534) to dryness on a water bath and then heat it for half an hour at 120° C. Treat the residue with 20 mils more of the hydrochloric acid, evaporate and heat as before, and repeat the operation three times. After cooling, digest the residue with a solution of ammonium nitrate (1 in 10) to which a few drops of nitric acid have been added, transfer it to a filter, wash the insoluble tungstic acid with diluted nitric acid, dry, ignite and weigh. (It is preferable to moisten this residue with a few drops of nitric acid and repeat the ignition.) This residue weighs not less than 0.69 Gm.

Stannous Chloride, $SnCl_2 + 2H_2O$.—Colorless crystals, readily soluble in water or alcohol. When in contact with the air or excess of water, the salt readily forms a basic chloride, hence, when dissolved, its solutions should be acidulated with hydrochloric acid. When tested for arsenic as directed under the Test for arsenic (see Test No. 1), 0.3 Gm. of stannous chloride produces no stain. A solution of 2 Gm. of stannous chloride, in 1 mil of distilled water and 0.5 mil of hydrochloric acid, does not become opalescent on diluting with 20 mils of distilled water (*lead*). Alternative method: Heat tin (see page 553) for several days with concentrated hydrochloric acid (see page 534) upon a water bath, taking care that the metal is in excess. When the acid has become saturated, pour off the clear fluid from the undissolved tin or precipitate, filter it while still hot through asbestos and set it aside until crystallization takes place. Break up the crystals, drain, and dissolve them at once as directed under the Test Solution.

Stannous Chloride Test Solution.—Dissolve 1 Gm. of stannous chloride crystals (see above) in 10 mils of distilled water to which a few drops of hydrochloric acid have been added to prevent the precipitation of basic chloride, and preserve the solution in a glass-stoppered bottle in which a fragment of tin (see page 553) has been placed. The solution must be renewed at frequent intervals.

Stannous Chloride Test Solution, Acid.—Dissolve 40 Gm. of stannous chloride crystals (see above) in 60 mils of concentrated hydrochloric acid (see page 534) and preserve it in a glass-stoppered bottle.

Stannous Chloride Test Solution, Saturated.—(For Bettendorf's Arsenic Test, see Test No. 2.) Prepare a saturated solution of stannous chloride crystals (see above) in concentrated hydrochloric acid (see page 534) or evaporate a solution prepared from metallic tin by the alternative method under *Stannous Chloride* (see above) to a specific gravity of about 2.00 at 25° C. After filtering the solution through asbestos it is transparent and has not more than a pale yellow color.

Starch (Potato).—The starch grains separated from the tubers of *Solanum tuberosum*, Linné (Fam. *Solanaceæ*). In a more or less finely granular powder, consisting of starch grains varying in shape from somewhat spherical or ellipsoidal to characteristic, with a few two- or three-compound grains; the individual grains with a circular point of origin of growth and distinct excentral lamellæ, the larger characteristic grains varying from 0.05 to 0.125 mm. in length, and under the micropolariscope showing a distinct cross and a strong play of color when a selenite plate is used.

Starch Test Solution.—Triturate 1 Gm. of corn starch (see page 19) with 10 mils of cold distilled water, add sufficient boiling distilled water with constant stirring to make about 200 mils, then boil the mixture for a few minutes until a thin, translucent fluid is obtained. This solution must be freshly prepared and filtered when required.

Succinic Acid, $H_2C_4H_4O_4$.—An organic acid obtained through the destructive distillation of amber or made synthetically. It forms colorless monoclinic prisms, soluble in about 20 parts of water, 2 parts of boiling water, 10 parts of alcohol, or 18 parts of acetone; very slightly soluble in ether and insoluble in chloroform or benzene. Succinic acid melts at about 182° C.

Sulphanilic Acid (Para-amidobenzenesulphonic Acid), $C_6H_4(NH_2)(SO_3H)1:4+2H_2O$.—Colorless, acicular, efflorescent crystals. When strongly heated, it carbonizes. Soluble in about 150 parts of cold water and insoluble in alcohol or ether.

Sulphanilic Acid Test Solution.—Dissolve 0.5 Gm. of sulphanilic acid in a mixture of 15 mils of glacial acetic acid and 135 mils of freshly distilled or recently-boiled distilled water. This reagent must be kept in well-stoppered bottles.

Sulpho-Salicylic Acid, $C_6H_3(OH)(SO_3H).COOH$.—Colorless, anhydrous needles very soluble in water and alcohol. It melts at about 120° C.

Sulphuric Acid.—Sulphuric acid of the purity required by the Pharmacopœia (see page 24), with a specific gravity of 1.832 at 25° C., will be satisfactory as a reagent unless otherwise directed.

Sulphuric Acid, Fuming, $H_2SO_4 + SO_3$.—A heavy, fuming, oily liquid, sometimes slightly colored, containing from 14 to 16 per cent. of free sulphur trioxide corresponding to from 84.2 to 84.6 per cent. of total sulphuric anhydride, with a specific gravity of from 1.869 to 1.875 at 25° C. Great caution should be exercised in handling fuming sulphuric acid. Render the acid homogeneous by shaking vigorously, then transfer several mils to a glass-stoppered weighing flask and weigh accurately. Remove about 1 mil of the acid to a dish containing from 30 to 40 mils of distilled water and again accurately weigh the flask, thus noting the quantity of acid taken for the assay. Titrate the solution of the acid in the dish with normal potassium hydroxide V.S., using methyl orange T.S. as indicator. One mil of normal potassium hydroxide V.S. corresponds to 0.040035 Gm. of sulphuric anhydride (SO_3). The percentage of SO_3 thus found, when subtracted from 100, represents the water present, for each 18.02 parts of which, 80.07 parts of SO_3 are required for the formation of H_2SO_4. After allowing for all of the water in this manner, the remaining SO_3 may be termed free SO_3.

Sulphuric Acid, Purified and Concentrated, for Tests, H_2SO_4.—When concentrated sulphuric acid is specified in a test, it is intended that the strongest purified acid of a specific gravity of not less than 1.834 at 25° C. be employed. In addition to the tests prescribed for this acid under *Acidum Sulphuricum* (see page 24), it is required to conform to the following more rigorous tests before it can be employed as a reagent: Dilute 1 part of the acid with 4 parts of distilled water; no stain is produced by 25 mils of this diluted acid when subjected to the Test for arsenic (see Test No. 1). Dilute 1 mil of the acid with 9 mils of distilled water, cool and pour it so as to form a layer over 5 mils of diphenylamine T.S. (see page 531); no blue color appears at the zone of contact (*nitric acid*). Upon carefully pouring about 2 mils of hydrochloric acid, in which a particle of sodium sulphite has been dissolved, over about 2 mils of the concentrated sulphuric acid, no reddish zone appears and no precipitate forms (*selenium*).

Sulphurous Acid.—An aqueous solution containing not less than 6 per cent. of sulphur dioxide. Ten mils of this solution, when mixed with 10 mils of dilute sulphuric acid (see under Arsenic Test, page 585) and evaporated on a water bath until free from sulphur dioxide, does not produce a stain when subjected to the Test for arsenic (see Test No. 1). Introduce about 2 mils of the acid into a flask containing 10 mils of distilled water, previously tared with its contents, stopper and weigh accurately. To this add 50 mils of tenth-normal iodine V.S., allow to stand five minutes, then titrate the excess of iodine with tenth-normal sodium thiosulphate V.S. It shows not less than 6 per cent. of SO_2. Each mil of tenth-normal iodine V.S. corresponds to 0.003204 Gm. of SO_2.

Tannic Acid Test Solution.—Dissolve 1 Gm. of tannic acid (see page 26) in 1 mil of alcohol, and add sufficient distilled water to measure 10 mils. This test solution should be freshly prepared when needed.

Tartaric Acid Test Solution.—Dissolve 1 part of tartaric acid (see page 27) in 3 parts of distilled water. This solution must be frequently renewed.

Tin, Sn.—Metallic tin in the granulated or mossy condition. Digest 5 Gm. of tin with 40 mils or a sufficient quantity of nitric acid (see page 18) on a bath of boiling water until entirely converted into a white powder, then evaporate it to dryness. Stir the residue with 25 mils of diluted nitric acid (see page 540) and 25 mils of distilled water, and filter. To the filtrate add 1 mil of diluted sulphuric acid and evaporate it as far as possible upon a water bath, and then add 10 mils of distilled water; no weighable residue remains undissolved (*lead*). When converted into stannous chloride (see page 551), it complies with the tests directed under that salt.

Toluol (Toluene, Methyl Benzene), $C_6H_5.CH_3$.—A colorless, refractive, inflammable liquid of peculiar aromatic odor; specific gravity about 0.865 at 25° C., boiling between 110° and 112° C. Miscible with alcohol, ether, chloroform, carbon disulphide, or petroleum benzin. It dissolves phosphorus, iodine, fats, or oils.

Trinitrophenol Test Solution (Picric Acid Test Solution), $C_6H_2(NO_2)_3.OH$.—Dissolve 1 Gm. of trinitrophenol (see page 471) in 100 mils of distilled water by the aid of heat. Cool the solution and filter it if necessary.

Turmeric Paper and Tincture.—See under *Indicators* (page 583).

Xylol (Xylene, Dimethyl Benzene), $C_6H_4(CH_3)_2$.—A mixture of ortho-, meta-, and para-xylene obtained through the distillation of coal tar naphtha. A colorless liquid of an odor resembling benzene. It boils between 136° and 140° C.; specific gravity about 0.850 at 25° C.; insoluble in water, but soluble in alcohol, ether, or chloroform.

Yeast.—Use the commercial compressed yeast cake.

Zinc, Zn.—Pure metallic zinc (see page 495).

Zinc for the Arsenic Test.—Zinc in mossy or globular form, the latter about 3 to 6 mm. in diameter, known as No. 7 Shot Zinc. This must conform with the tests for purity as given under *Zincum* and in addition the following: The stain from 8 Gm. of zinc, when determined by a blank experiment as directed under the Test for arsenic (see Test No. 1), should scarcely be perceptible. Introduce 10 Gm. of the zinc into a flask of about 250 mils capacity, provided with a perforated rubber stopper and a rubber-valve tube, and containing 60 mils of distilled water, 15 mils of concentrated sulphuric acid for tests (see page 552) and 1 drop of copper sulphate T.S. When the reaction slackens, place the flask on a water bath and warm until solution of the zinc is complete. At once begin to add tenth-normal potassium permanganate V.S., drop by drop, with agitation, until the solution assumes a faint pink tint which remains permanent for one-half minute. Not more than 1.4 mils of tenth-normal potassium permanganate V.S. is required, indicating not over 0.08 per cent. of oxidizable matter, calculated as metallic iron (Fe).

Zinc Dust (Powdered Zinc).—Zinc in the form of a fine gray powder.

Zinc Oxide, ZnO.—When used in the assay of phosphoric acid, the phosphates or the hypophosphites, it must comply with the tests given under *Zinci Oxidum* (see page 492) and also the following: Dissolve 1 Gm. of zinc oxide in 20 mils of distilled water and 5 mils of nitric acid in a test tube about 2 cm. in diameter and add a few drops of silver nitrate T.S.; not more than a slight opalescence is produced.

Volumetric Solutions

It is absolutely necessary that the measuring vessels employed in the operations of volumetric analysis, consisting of burettes, flasks, mixing cylinders, pipettes, etc., shall agree among themselves accurately in their graduation at the standard temperature selected. All volumetric solutions should be prepared at the standard temperature of 25° C. and used in titrations, if practicable, at that standard temperature. If titrations are made at any other temperature, a volumetric solution should be used which has been standardized for such temperature. In case graduated apparatus calibrated at 25° C. is not procurable, volumetric solutions may be prepared at the temperature for which the apparatus in hand was graduated (*e.g.*, 15° C. or 20° C.), and all such volumetric solutions should be marked to indicate the temperature which has been used. Such solutions must be used as above stated at such standard temperature, care being taken that all graduated apparatus used be standardized at the same temperature.

Units of Capacity.—The units of volume employed by the Pharmacopœia must accord with its standard liter at 25° C. which represents the volume occupied by 996.04 Gm. of distilled water, weighed in air with brass weights, at a temperature of 25° C.* and barometer at 760 mm. To secure uniformity among the various forms of apparatus employed, the standard specifications of the U. S. Bureau of Standards should be adhered to as closely as possible, excepting that the temperature here adopted is 25° C. The tables for calibrating graduated apparatus will be found on page 653.

Measuring Flasks.—Standard measuring flasks are calibrated to contain, when filled to the mark, 1000, 500, 250, 200 or 100 mils at 25° C. The necks must be of uniform calibre, and measure in diameter not less than 14 mm. nor more than 20 mm. for 1000 mil capacity; from 12 mm. to 18 mm. for 500 mil capacity; from 10 mm. to 15 mm. for 250 mil capacity and from 8 mm. to 12 mm. for 100 mil capacity. The capacity mark on any of these flasks should not be less than 6 cm. distant from the mouth and not less than 2 cm. from the base of the neck.

Cylinders.—These should be graduated to contain their respective volumes at the standard temperature. Their inside diameter must not be more than one-fifth the graduated length.

Transfer Pipettes.—These should be graduated to deliver at standard temperature the exact volume of fluid indicated. The suction stem should be at least 16 cm. long, and the delivery tube not less than 3 cm. nor more than 25 cm. long. The inside diameter at the capacity mark must not be less than 2 mm. and not exceed 4 mm. for those of 25 mil capacity. The capacity mark should not be more than 6 cm. from the bulb. The outlet of any transfer pipette should be of such size that the free outflow shall last not more than 1 minute, nor less than 15 seconds for 5 mils, 20 seconds for 10 mils and 30 seconds for 50 mils. After filling, the fluid adhering to the outside should be wiped from the stem; then when draining the contents, the pipette should be held in a vertical position; finally, to complete the emptying, the tip of the pipette should be held against the side of the vessel, permitting the last portions of the fluid to flow out by gravity. Pipettes should never be drained by blowing into them.

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* 500 mils would weigh 498.02 Gm.; 250 mils, 249.01 Gm.; 100 mils, 99.604 Gm.

Burettes.—These must be provided with glass stop-cocks and be graduated for use at the standard temperature. Burettes provided with rubber tubes and pinch-cocks in place of glass stop-cocks may be used for potassium and sodium hydroxide V.S. The tips should be gradually tapered from 2 to 3 cm. in length and slightly bent. The rate of outflow should be regulated so that not less than 2 seconds should be consumed for each mil of the length of the column delivered. When completing titration, the tip of the delivery tube should be touched with the wet surface of the receiving vessel to complete the emptying.

General Directions.—All bottles in which volumetric solutions are to be kept, as well as the burettes or pipettes in which they are to be measured, should, prior to use, be thoroughly cleaned and rinsed first with distilled water, and then with two or three small portions of the solution that they are to contain. In all apparatus where the surface of the fluid is limited by a meniscus, the reading must be made from the lowest point of the meniscus unless the liquid is too opaque to permit exact observation of that point. It is of the utmost importance that the inner surface of all measuring apparatus shall be free from any suggestion of greasiness.

Normal volumetric solutions $\left(\frac{N}{1}\right)$ are those which contain in 1000 mils, in any stated reaction, the chemical equivalent of one gramme of hydrogen. If the molecule of the reagent is univalent, one liter will contain a weight in grammes equal to the molecular weight of the reagent; if bivalent, a weight in grammes equal to one-half its molecular weight; if trivalent, a weight in grammes equal to one-third its molecular weight. Thus, hydrochloric acid, $HCl = 36.47$, having but one H atom replaceable by a basic element, has 36.47 Gm. of HCl in 1000 mils of the normal volumetric solution; while sulphuric acid, $H_2SO_4 = 98.09$, having two replaceable H atoms, contains only one-half this number, or 49.045 Gm. of H_2SO_4 in 1000 mils of its normal solution. Potassium hydroxide, $KOH = 56.11$, has but one K to replace one H in acids, hence its normal solution contains 56.11 Gm. of KOH in one liter. Again, one molecule of potassium dichromate ($K_2Cr_2O_7 = 294.20$) in oxidation liberates three atoms of oxygen which are capable of oxidizing six atoms of ferrous to ferric iron. Therefore, each molecule of the dichromate, yielding three atoms of oxygen, is equivalent to six atoms of hydrogen. Hence, the normal solution should contain $\frac{294.20}{6}$ or 49.0333 Gm. in 1000 mils. Two molecules of potassium permanganate, $2KMnO_4 = 316.06$, in oxidation, give off five atoms of O, which are equivalent to ten atoms of H; hence its normal solution should contain $\frac{316.06}{10}$ or 31.606 in 1000 mils. Solutions containing in 1000 mils one-tenth of the quantity of the active reagent in the normal solution are called tenth-normal $\left(\frac{N}{10}\right)$ (normality = 0.1); those containing one-hundredth, hundredth-normal $\left(\frac{N}{100}\right)$ (normality = 0.01); those containing one-fiftieth, fiftieth-normal $\left(\frac{N}{50}\right)$ (normality = 0.02); those containing twice the amount, double-normal $\left(\frac{2N}{1}\right)$ (normality = 2); half the amount, half-normal $\left(\frac{N}{2}\right)$ (normality = 0.5). Solutions containing quantities of the active reagent having no simple relation to the molecular weight are called empirical.

Use of Empirical Solutions.—All standard volumetric solutions are liable to deteriorate in time, some very slowly, others rapidly, especially when not properly preserved. To restore the titer of such solutions (that is, to make them exactly normal, tenth-, or hundredth-normal, as the case may be) each time they are to be used, involves an unnecessary waste of time. If one accurately standardized solution be always available, it is not necessary that the other volumetric solutions employed in conjunction with it be adjusted to exactly correspond, mil for mil, so long as the *exact* ratio is known at standard temperature. The percentage strength of any empirical solution as compared with a standard volumetric solution is ascertained by experiment, then the number of mils of the empirical solution consumed in the titration of the substance is multiplied by its percentage strength, which product represents the equivalent volume of the true standard solution.

Example: One gramme of potassium carbonate required for neutralization 22 mils of an empirical solution of hydrochloric acid. In a trial experiment, 16 mils of this weak solution was required to neutralize 10 mils of a standard normal potassium hydroxide V.S. The former was therefore of 62.5 per cent. strength (for $16 : 10 :: 100 : x$. $x = 62.5$), hence the 22 mils of empirical solution consumed represents 13.75 mils (62.5 per cent. of 22) of standard normal hydrochloric acid V.S. Therefore since 1 mil of $\frac{N}{1}$ hydrochloric acid V.S. $= 0.0691$ Gm. of K_2CO_3, 13.75 mils would be equivalent to 13.75×0.0691 or $0.9501+$ Gm. of potassium carbonate.

Adjustment of titer of volumetric solutions which are above strength. Titrate 25 mils of the strong solution, with a carefully standardized corresponding solution, which must be of the same standard temperature. The number of mils of the latter consumed, divided by 25, will give the factor to be employed in adjusting the strength of the former.

Example: 25 mils of a "strong" normal solution of hydrochloric acid required 27.25 mils of standard normal potassium hydroxide V.S. for neutralization. The correcting factor is therefore $27.25 \div 25 = 1.09$. If the "strong" solution measures 875 mils its volume must be made up with distilled water to $875 \times 1.09 = 953.75$ mils. Add therefore to the "strong" solution $953.75 - 875 = 78.75$ mils of distilled water. After the solution is thus diluted, its titer should be verified by the titration of 25 mils with the standard normal potassium hydroxide V.S., the measurements in each case being made at 25° C. (or at least at the same temperature). It should require exactly 25 mils of the latter for neutralization. If this is not the case, either a new adjustment must be made, or else the new correction factor must be plainly written on the label of the bottle, and the required correction made whenever the solution is used.

Alkaline Cupric Tartrate Volumetric Solution

FEHLING'S SOLUTION

A. The Copper Solution.—Dissolve 34.66 Gm. of carefully selected, small crystals of cupric sulphate (*Cupri Sulphas,* U.S.P.), showing no trace of efflorescence or of adhering moisture, in a sufficient quantity of distilled water to make the solution measure exactly 500 mils at standard temperature. Keep this solution in small, well-stoppered bottles.

B. The Alkaline Tartrate Solution.—Dissolve 173 Gm. of crystallized potassium and sodium tartrate (*Potassii et Sodii Tartras,* U.S.P.) and 50 Gm. of sodium hydroxide (*Sodii Hydroxidum,* U.S.P.) in a sufficient quantity of distilled water to make the solution measure exactly 500 mils at standard temperature. Keep the solution in small, rubber-stoppered bottles. For use, mix exactly equal volumes of the two solutions at the time required.*

One Mil of the Mixed Solution is the equivalent of:

	Gramme.
Cupric Sulphate, crystallized, $CuSO_4+5H_2O$	0.03466
Cupric Tartrate, $CuC_4H_4O_6+3H_2O$	0.03688
Cane Sugar, $C_{12}H_{22}O_{11}$ (after inversion)	0.00475
Glucose, anhydrous, $C_6H_{12}O_6$	0.00500
Milk Sugar, anhydrous, $C_{12}H_{22}O_{11}$	0.00678

Tenth-Normal Barium Hydroxide Volumetric Solution

$Ba(OH)_2+8H_2O=315.51$ 15.776 Gm. in 1000 mils

Dissolve about 18 Gm. of crystallized barium hydroxide in 1000 mils of recently boiled and cooled distilled water, and, if necessary, filter the solution quickly.

Introduce 25 mils of tenth-normal sulphuric acid V.S. or preferably tenth-normal hydrochloric acid V.S. into a flask, add 3 drops of phenolphthalein T.S., and run in the barium hydroxide solution from a burette, provided with a soda-lime tube, reducing the flow to drops towards the end, until a pale pink color is produced which no longer disappears on shaking the liquid for about ten seconds. Note the number of mils of the barium hydroxide solution consumed, and if the solution is too concentrated dilute the remainder of the solution with freshly boiled and cooled distilled water, so that equal volumes of the barium hydroxide solution and of tenth-normal sulphuric or hydrochloric acid at 25° C. exactly neutralize each other.

Note: This solution absorbs carbon dioxide from the air very rapidly, thereby changing its titer. It should, therefore, be preserved in rubber-stoppered bottles provided with a soda-lime tube (see under normal potassium hydroxide V.S.). This solution must also be standardized each time before using.

One Mil of Tenth-Normal Barium Hydroxide V.S. is the equivalent of:

	Gramme.
Barium Hydroxide, $Ba(OH)_2+8H_2O$	0.015776
Ammonium Benzoate, $NH_4C_7H_5O_2$	0.013908
Ammonium Salicylate, $NH_4C_7H_5O_3$	0.015508
Benzoic Acid, $C_7H_6O_2$	0.012205
Hydrochloric Acid, HCl	0.003647
Salicylic Acid, $C_7H_6O_3$	0.013805
Sulphuric Acid, H_2SO_4	0.0049045

Tenth-Normal Bromine Volumetric Solution

[Koppeschaar's Solution]

$Br=79.92$ 7.992 Gm. in 1000 mils

Dissolve 3 Gm. of potassium bromate (see page 544) and 50 Gm. of potassium bromide in sufficient distilled water to measure 1000 mils at or near 25° C. Transfer

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* The accuracy of this solution when employed in titration may be verified as follows: To a solution of 0.95 Gm. of pure cane sugar in about 50 mils of distilled water, add 2 mils of hydrochloric acid and heat at 70° C. for ten minutes. After neutralizing with sodium carbonate, dilute the solution to 1000 mils. Fifty mils of this dilution should reduce the copper in exactly 10 mils of the solution.

20 mils of this solution at standard temperature, by means of a pipette, to a bottle having a capacity of about 250 mils, and provided with a glass stopper; add 75 mils of distilled water and 5 mils of hydrochloric acid (see page 13) and immediately insert the stopper. Shake the bottle a few times, then remove the stopper just sufficiently to quickly introduce 5 mils of potassium iodide T.S., taking care that no bromine vapors escape, and immediately stopper the bottle. Agitate the bottle thoroughly, remove the stopper and rinse it and the neck of the bottle with a little distilled water so that the washings flow into the bottle, and then add from a burette tenth-normal sodium thiosulphate V.S. until the solution is only slightly yellow, then add a few drops of starch T.S. and continue the addition of the tenth-normal sodium thiosulphate V.S. until the blue color is just discharged. Note the number of mils of the sodium thiosulphate V.S. thus consumed, and then dilute the bromine solution so that equal volumes of it and of tenth-normal sodium thiosulphate V.S. will exactly correspond to each other under the conditions mentioned above. Keep the solution in dark amber-colored, glass-stoppered bottles.

Example: Assuming that the 20 mils of the bromine solution have required 22.5 mils of the sodium thiosulphate V.S. to completely discharge the iodine tint, then each 20 mils of the bromine solution must be diluted to 22.5 mils. Thus, if 960 mils of the solution remain, it must be diluted with distilled water to measure 1080 mils. After the solution is thus diluted, a new trial should be made in the manner above described, in which 25 mils of the tenth-normal sodium thiosulphate V.S. should just discharge the tint of the iodine liberated by the bromine set free from 25 mils of the standard bromine solution.

One Mil of Tenth-Normal Bromine V.S. is the equivalent of:

	Gramme.
Bromine, Br	0.007992
Orcin, $C_7H_6(OH)_2$	0.002068
Phenol, C_6H_5OH	0.001568
Resorcinol, $C_6H_4(OH)_2$	0.001834
Sodium Phenolsulphonate, anhydrous, $NaC_6H_5O_4S$	0.004903
Sodium Phenolsulphonate, crystallized, $NaC_6H_5O_4S+2H_2O$	0.0058035

Normal Hydrochloric Acid Volumetric Solution

$HCl=36.47$ 36.47 Gm. in 1000 mils

Mix 110 mils of hydrochloric acid (*Acidum Hydrochloricum*, U.S.P.) with sufficient distilled water to measure 1000 mils. Of this liquid (which is still too concentrated) carefully measure, at standard temperature from a burette, 25 mils into a flask or porcelain dish, and after diluting with about double its volume of distilled water, add 2 drops of methyl orange T.S., then gradually add from a burette a freshly standardized normal potassium hydroxide V.S., at the same temperature, until the red or pink tint of the solution changes, after continuous shaking or stirring, to a permanent pale yellow. Note the number of mils of potassium hydroxide V.S. consumed, and then dilute the acid solution so that equal volumes of this and of the normal potassium hydroxide V.S. neutralize each other at 25° C.

Example: Assuming that 25 mils of the acid solution first prepared required exactly 27.5 mils of normal potassium hydroxide V.S., each 25 mils of the former must be diluted to 27.5 mils or the whole of the remaining acid solution in the same proportion at standard temperature. Thus, if 950 mils should remain, 95 mils of distilled water must be added. After the liquid is thus diluted, a new trial should be made in the manner above described, in which 25 mils of the acid solution should require for neutralization exactly 25 mils of normal potassium hydroxide V.S. If necessary, a new adjustment should then be made to render the correspondence perfect at standard temperature.

ALTERNATIVE METHOD.—Normal hydrochloric acid V.S. may be standardized as directed under normal sulphuric acid V.S., employing the alternative method.

One Mil of Normal Hydrochloric Acid V.S. is the equivalent of:

	Gramme.
Hydrochloric Acid, HCl	0.03647
Barium Hydroxide, $Ba(OH)_2+8H_2O$	0.15776
Calcium Carbonate, $CaCO_3$	0.050035
Calcium Hydroxide, $Ca(OH)_2$	0.037045
Calcium Oxide, CaO	0.028035
Potassium Hydroxide, KOH	0.05611
Sodium Borate, anhydrous, $Na_2B_4O_7$	0.1010
Sodium Borate, crystallized, $Na_2B_4O_7+10H_2O$	0.19108
Sodium Cacodylate, anhydrous, $Na(CH_3)_2.AsO_2$	0.1600
Sodium Hydroxide, NaOH	0.04001

NOTE: Normal hydrochloric acid is in every respect equivalent in neutralizing power to normal sulphuric acid (see page 575), and may be employed, except in special cases, for the same purposes.

Half-Normal Hydrochloric Acid Volumetric Solution

HCl = 36.47 18.235 Gm. in 1000 mils

Dilute 500 mils of normal hydrochloric acid V.S. at 25° C. with sufficient distilled water to measure at the same temperature exactly 1000 mils.

One Mil of Half-Normal Hydrochloric Acid V.S. is the equivalent of:

	Gramme.
Hydrochloric Acid, HCl	0.018235
Benzaldehyde, C_7H_6O	0.0530
Calcium Lactate, $Ca(C_3H_5O_3)$, anhydrous	0.05454
Cinnamic Aldehyde, C_9H_8O	0.033015
Citral, $C_{10}H_{16}O$	0.076
Lithium Salicylate, $LiC_7H_5O_3$	0.07199
Magnesium Hydroxide, $Mg(OH)_2$	0.0148
Potassium Acetate, $KC_2H_3O_2$	0.04906
Potassium Bicarbonate, $KHCO_3$	0.050055
Potassium Bitartrate, $KHC_4H_4O_6$	0.09407
Potassium Carbonate, anhydrous, K_2CO_3	0.03455
Potassium Citrate, anhydrous, $K_3C_6H_5O_7$	0.051057
Potassium Citrate, crystallized, $K_3C_6H_5O_7+H_2O$	0.05406
Potassium Hydroxide, KOH	0.028055
Potassium and Sodium Tartrate, anhydrous, $KNaC_4H_4O_6$	0.052533
Potassium and Sodium Tartrate, crystallized, $KNaC_4H_4O_6+4H_2O$	0.07055
Sodium Acetate, anhydrous, $NaC_2H_3O_2$	0.04101

	Gramme.
Sodium Acetate, crystallized, $NaC_2H_3O_2+3H_2O$	0.068035
Sodium Benzoate, $NaC_7H_5O_2$	0.07202
Sodium Bicarbonate, $NaHCO_3$	0.042005
Sodium Carbonate, anhydrous, Na_2CO_3	0.026500
Sodium Carbonate, monohydrated, $Na_2CO_3+H_2O$	0.031005
Sodium Citrate, anhydrous, $Na_3C_6H_5O_7$	0.04301
Sodium Citrate, crystallized, $Na_3C_6H_5O_7+2H_2O$	0.04901
Sodium Glycerophosphate, $Na_2C_3H_7PO_6$	0.10805
Sodium Hydroxide, NaOH	0.020005
Sodium Salicylate, $NaC_7H_5O_3$	0.08002
Sodium Tartrate, neutral, $Na_2C_4H_4O_6+2H_2O$	0.057515
Strontium Salicylate, anhydrous, $Sr(C_7H_5O_3)_2$	0.09043
Strontium Salicylate, crystallized, $Sr(C_7H_5O_3)_2+2H_2O$	0.099435

Tenth-Normal Iodine Volumetric Solution

I = 126.92 12.692 Gm. in 1000 mils

Tenth-normal iodine V.S. may be prepared according to either of the following methods:

I. Dissolve 12.692 Gm. of purified iodine (see page 535) in a solution of 18 Gm. of potassium iodide in 300 mils of distilled water. Then add sufficient distilled water to make the solution measure exactly 1000 mils at standard temperature. Transfer the solution to glass-stoppered bottles. Unless freshly prepared, its strength should always be determined anew at the time it is used.

II. Tenth-normal iodine V.S. may also be prepared as follows:

Dissolve about 14 Gm. of iodine (*Iodum*, U.S.P.) in a solution of 18 Gm. of potassium iodide (*Potassii Iodidum*, U.S.P.) in about 300 mils of distilled water, diluting finally to 1000 mils. Carefully measure from a burette 25 mils of this solution (which is too concentrated), into a flask, then add gradually and cautiously from a burette tenth-normal sodium thiosulphate V.S. (shaking constantly), until the color of the solution is but slightly yellow, then add a few drops of starch T.S. and continue the addition of the tenth-normal sodium thiosulphate V.S. until the blue color is just discharged. Note the number of mils of the sodium thiosulphate V.S. consumed, and then dilute the iodine solution so that 25 mils will require for decolorization exactly 25 mils of the tenth-normal sodium thiosulphate V.S. at standard temperature.

One Mil of Tenth-Normal Iodine V.S. is the equivalent of:

	Gramme.
Iodine, I	0.012692
Acetone, $(CH_3)_2CO$	0.0009675
Antimony and Potassium Tartrate, crystallized, $K(SbO)C_4H_4O_6+\frac{1}{2}H_2O$	0.016617
Arsenic, in arsenous compounds, As	0.003748
Arsenic Iodide, AsI_3	0.022786
Arsenic Trioxide (Arsenous Acid), As_2O_3	0.004948
Calcium Sulphide, crude, CaS	0.003607
Iron, Fe	0.002792
Mercurous Chloride, HgCl	0.023606

	Gramme.
Mercurous Iodide, HgI	0.032752
Mercury (in mercurous compounds), Hg	0.02006
Potassium Sulphite, crystallized, $K_2SO_3+2H_2O$	0.009715
Sodium Bisulphite, $NaHSO_3$	0.005204
Sodium Sulphite, anhydrous, Na_2SO_3	0.006304
Sodium Thiosulphate, anhydrous, $Na_2S_2O_3$	0.015814
Sodium Thiosulphate, crystallized, $Na_2S_2O_3+5H_2O$	0.024822
Sulphur Dioxide, SO_2	0.0032035

Tenth-Normal Oxalic Acid Volumetric Solution

$H_2C_2O_4+2H_2O=126.05$ 6.3025 Gm. in 1000 mils

Dissolve 6.45 Gm. of purified oxalic acid (see page 541) in sufficient distilled water to measure 1000 mils. Into a flask accurately measure from a burette 25 mils of a freshly standardized tenth-normal potassium hydroxide V.S., dilute with about 20 mils of distilled water, add 3 to 5 drops of phenolphthalein T.S. and heat it to boiling. From a burette gradually add the oxalic acid solution (which is still too concentrated) until the red tint of the alkali solution fails to reappear after vigorous shaking and boiling. Note the number of mils of the oxalic acid solution consumed, and then dilute it so that equal volumes of this and of the tenth-normal potassium hydroxide V.S. neutralize each other at standard temperature. This volumetric solution deteriorates on standing, hence must be frequently renewed or restandardized.

Note: Tenth-normal oxalic acid V.S. is in every respect equivalent in neutralizing power to any other tenth-normal acid V.S. with either litmus or phenolphthalein T.S. as indicator. Its specific use, however, is in standardizing or determining an excess of tenth-normal potassium permanganate V.S.

One Mil of Tenth-Normal Oxalic Acid V.S. is the equivalent of:

	Gramme.
Oxalic Acid, crystallized, $H_2C_2O_4+2H_2O$	0.0063025
Ammonia Gas, NH_3	0.0017034
Calcium Carbonate, $CaCO_3$	0.0050035
Calcium Hydroxide, $Ca(OH)_2$	0.0037045
Calcium Oxide, CaO	0.0028035
Lead, Pb	0.010355
Lead Acetate, $Pb(C_2H_3O_2)_2$	0.016257
Lead Oxide, PbO	0.011155
Lead Peroxide, PbO_2	0.011955
Lead Subacetate, $Pb_2O(C_2H_3O_2)_2$	0.013706
Manganese Dioxide, MnO_2	0.0043465
Potassium Hydroxide, KOH	0.005611
Potassium Permanganate, $KMnO_4$	0.0031606
Sodium Hydroxide, NaOH	0.004001

Tenth-Normal Potassium Dichromate Volumetric Solution

$K_2Cr_2O_7=294.20$ 4.9033 Gm. in 1000 mils

Dissolve 4.9033 Gm. of purified potassium dichromate (see page 544), which has been pulverized and dried to constant weight at 120° C., in sufficient distilled water to measure exactly 1000 mils at standard temperature. When used as an oxidizing agent in titration to convert ferrous into ferric salts, or to liberate iodine from potassium iodide, the solution just mentioned (containing 14.710 Gm. in 1000 mils) has the effect of a $\frac{3N}{10}$ volumetric solution, and a solution of one-third of this strength, containing 4.9033 Gm. in 1000 mils, has the value of a tenth-normal solution, and is the equivalent of an equal volume of tenth-normal potassium permanganate V.S., or, in the case of iodine liberated from potassium iodide, it is the equivalent of an equal volume of tenth-normal sodium thiosulphate V.S. For titrating iron in ferrous compounds, it is used in the following manner. Introduce the aqueous solution of the ferrous salt into a flask and, if it is not already acid, render it so with sulphuric acid. Now add gradually tenth-normal potassium dichromate V.S. from a burette with agitation until a drop taken out upon a white surface no longer becomes blue when mixed with a drop of freshly prepared potassium ferricyanide T.S. Tenth-normal potassium dichromate V.S. may also be used in conjunction with potassium iodide (from which it liberates iodine) and sulphuric acid, for adjusting the titer of sodium thiosulphate V.S., and thus that of the iodine V.S.

One Mil of Tenth-Normal Potassium Dichromate V.S. is the equivalent of:

	Gramme.
Potassium Dichromate, $K_2Cr_2O_7$	0.0049033
Ferrous Carbonate, $FeCO_3$	0.011584
Ferrous Sulphate, anhydrous, $FeSO_4$	0.015191
Ferrous Sulphate, crystallized, $FeSO_4+7H_2O$	0.027802
Iron, in ferrous compounds, Fe	0.005584
Sodium Thiosulphate, $Na_2S_2O_3+5H_2O$	0.024822

Normal Potassium Hydroxide Volumetric Solution

$KOH = 56.11$ 56.11 Gm. in 1000 mils

Dissolve 75 Gm. of potassium hydroxide (see page 338) in sufficient recently boiled distilled water to measure about 1050 mils and fill a burette with a portion of this liquid. Into a flask of the capacity of about 300 mils, introduce 4.7035 Gm. of potassium bitartrate (which has been purified and dried as directed on page 543) followed by 15 mils (accurately measured at 25° C.) of the potassium hydroxide solution which is being prepared and 80 mils of distilled water. Heat the solution to boiling, add from 3 to 5 drops of phenolphthalein T.S. and then cautiously, at standard temperature from a burette, further portions of the potassium hydroxide solution. Agitate the flask frequently, boil the liquid toward the end of the operation and reduce the flow of potassium hydroxide solution to drops, until the red color produced by its influx no longer disappears on shaking, and the liquid is not deeper in color than a pale pink. Note the total number of mils of the potassium hydroxide solution consumed, and then dilute the remainder of the solution so that exactly 25 mils of the diluted liquid, at standard temperature, shall be required to neutralize 4.7035 Gm. of the purified and dried potassium bitartrate.

Example: Assuming that 20 mils of the stronger solution of potassium hydroxide first prepared had been consumed in the trial, then each 20 mils must be diluted to 25 mils or the whole of the remaining solution in the same proportion at standard temperature. Thus, if 1000 mils should be still remaining, this must be diluted with water to 1250 mils. After the liquid is thus diluted, a new trial should be made in the manner above described, in which 25 mils of the diluted solution should exactly neutralize 4.7035 Gm. of potassium bitartrate at standard temperature. If necessary, a new adjustment should then be made to render the correspondence perfect.

Alternative Method.—Normal potassium or sodium hydroxide V.S. may be standardized against normal sulphuric acid V.S. which has been standardized by its alternative method, employing the trial solution directed in the first paragraph. Measure accurately 25 mils of this solution, at standard temperature, from a burette into a flask, add 2 drops of methyl orange T.S. or methyl red T.S., and afterwards from a burette the standard normal sulphuric acid V.S. at the same temperature, shaking after each addition, and, toward the end of the operation, reducing the flow to drops, until the yellow tint of the solution changes to a permanent rose after shaking. Note the number of mils of normal sulphuric acid V.S. consumed. Then dilute the potassium hydroxide solution so that 25 mils of this and 25 mils of the normal sulphuric acid V.S., at standard temperature, exactly neutralize each other.

Note: Solutions of caustic alkalies absorb carbon dioxide from the atmosphere, and thereby change their titer when used with litmus T.S., or phenolphthalein T.S. (in cold solution), as indicator (methyl orange T.S. is not affected by the presence of carbonic acid). Hence the volumetric solutions should be preserved in bottles provided with well-fitting rubber stoppers, or, better still, these should be provided with the tubes filled with soda-lime (a mixture of caustic soda and lime); the tubes pass through a perforation in the rubber stoppers and thus absorb the carbon dioxide and prevent its access to the solution. If the solution is kept in a burette for more than a few minutes, the same provision with a soda-lime tube should be observed. In place of potassium hydroxide V.S., sodium hydroxide V.S. (see page 573) may be used, in the same manner and in the same quantity.

One Mil of Normal Potassium Hydroxide V.S. is the equivalent of:

	Gramme.
Potassium Hydroxide, KOH	0.05611
Acetic Acid, $HC_2H_3O_2$	0.06003
Acetic Acid Anhydride, $(CH_3CO)_2O$	0.05102
Ammonia Gas, NH_3	0.01703
Ammonium Chloride, NH_4Cl	0.05350
Boric Acid, H_3BO_3	0.06202
Citric Acid, crystallized, $H_3C_6H_5O_7+H_2O$	0.07003
Formaldehyde, CH_2O	0.03002
Hydrated Chloral, $C_2HOCl_3+H_2O$	0.1654
Hydriodic Acid, HI	0.12793
Hydrobromic Acid, HBr	0.08093
Hydrochloric Acid, HCl	0.03647
Hypophosphorous Acid, HPH_2O_2	0.06606
Lactic Acid, $HC_3H_5O_3$	0.09005
Nitric Acid, HNO_3	0.06302
Oxalic Acid, crystallized, $H_2C_2O_4+2H_2O$	0.063025
Paraformaldehyde, $(CH_2O)_3$	0.03002
Phosphoric Acid, H_3PO_4 (to form K_2HPO_4; with phenolphthalein	0.04903
Potassium Bitartrate, $KHC_4H_4O_6$	0.18814
Sodium Bitartrate, $NaHC_4H_4O_6+H_2O$	0.19006
Sodium Hydroxide, $NaOH$	0.04001

	Gramme.
Sulphuric Acid, H_2SO_4	0.049045
Sulphuric Anhydride, SO_3	0.040035
Tartaric Acid, $H_2C_4H_4O_6$	0.07503
Trichloracetic Acid, $HC_2O_2Cl_3$	0.16339

Half-Normal Potassium Hydroxide Volumetric Solution

KOH = 56.11 28.055 Gm. in 1000 mils

Dilute 500 mils of freshly standardized normal potassium hydroxide V.S., at standard temperature, with sufficient recently boiled distilled water at the same temperature to measure exactly 1000 mils. This solution may also be prepared and standardized directly with potassium bitartrate, as directed under normal potassium hydroxide V.S., employing for this purpose 2.3518 Gm. of the former and a solution of about 35 Gm. of potassium hydroxide (*Potassii Hydroxidum*, U.S.P.) in 1000 mils of distilled water. Twenty-five mils of half-normal solution, at standard temperature, should exactly neutralize 2.3518 Gm. of potassium bitartrate (see page 543). This solution may also be standardized by comparison with half-normal sulphuric acid V.S., employing methyl-orange T.S. as indicator.

NOTE: The same precautions should be taken for protecting this solution from carbon dioxide of the air as are directed under normal potassium hydroxide V.S.

One Mil of Half-Normal Potassium Hydroxide V.S. is the equivalent of:

	Gramme.
Potassium Hydroxide, KOH	0.02806
Acetic Acid, $HC_2H_3O_2$	0.03002
Boric Acid, H_3BO_3	0.03101
Citric Acid, crystallized, $H_3C_6H_5O_7+H_2O$	0.03502
Hydriodic Acid, HI	0.06397
Hydrobromic Acid, HBr	0.04047
Hydrochloric Acid, HCl	0.01824
Hypophosphorous Acid, HPH_2O_2	0.03303
Lactic Acid, $HC_3H_5O_3$	0.04503
Nitric Acid, HNO_3	0.03151
Oxalic Acid, crystallized, $H_2C_2O_4+2H_2O$	0.03153
Phosphoric Acid, H_3PO_4 (to form K_2HPO_4, with phenolphthalein)	0.02452
Potassium Bitartrate, $KHC_4H_4O_6$	0.09407
Sodium Bitartrate, $NaHC_4H_4O_6+H_2O$	0.09503
Sodium Hydroxide, NaOH	0.020005
Sulphuric Acid, H_2SO_4	0.024523
Sulphuric Anhydride, SO_3	0.02002
Tartaric Acid, crystallized, $H_2C_4H_4O_6$	0.03751
Trichloracetic Acid, $HC_2O_2Cl_3$	0.08170

Tenth-Normal Potassium Hydroxide Volumetric Solution

KOH = 56.11 5.611 Gm. in 1000 mils

Dilute 100 mils of freshly standardized normal potassium hydroxide V.S., at standard temperature, with sufficient recently boiled distilled water at the same temperature to measure exactly 1000 mils. This solution may also be prepared and standardized directly with potassium bitartrate, as directed under normal potassium hydroxide V.S., employing for this purpose 0.9407 Gm. of the bitartrate and a solution of about 7.5 Gm. of potassium hydroxide (*Potassii Hydroxidum*, U.S.P.) in 1000 mils of distilled water. Fifty mils of tenth-normal solution, at standard temperature, should exactly neutralize 0.9407 Gm. of potassium bitartrate (see page 543). This solution may also be standardized by comparison with tenth-normal sulphuric acid V.S., employing methyl orange T.S. as indicator.

NOTE: The same precautions should be taken for protecting this solution from carbon dioxide of the air as are directed under normal potassium hydroxide V.S.

One Mil of Tenth-Normal Potassium Hydroxide V.S. is the equivalent of:

	Gramme.
Potassium Hydroxide, KOH	0.005611
Betaeucaine Hydrochloride, $C_{15}H_{21}O_2N.HCl$	0.028365
Lactic Acid, $HC_3H_5O_3$	0.009005
Potassium Bitartrate, $KHC_4H_4O_6$	0.018814
Sulphuric Acid, H_2SO_4	0.0049045

Fiftieth-Normal Potassium Hydroxide Volumetric Solution

$KOH = 56.11$ 1.1222 Gm. in 1000 mils

Dilute 20 mils of a freshly standardized normal or preferably 200 mils of tenth-normal potassium hydroxide V.S. at standard temperature, with sufficient recently boiled distilled water at the same temperature to measure exactly 1000 mils. Verify the titer of this solution by titrating 0.1881 Gm. of potassium bitartrate (see page 543) which should require for neutralization exactly 50 mils of the volumetric solution. This standard solution is employed in conjunction with the tenth-normal sulphuric acid V.S. in the titration of alkaloids, with hematoxylin, cochineal, methyl red, or iodeosin T.S. as indicators. The relative value of these two volumetric solutions should be determined each time, using the indicator employed in the alkaloidal assay.

NOTE: The same precautions should be taken for protecting this solution from carbon dioxide of the air as are directed under normal potassium hydroxide V.S. It should be renewed at frequent intervals.

One Mil of Fiftieth-Normal Potassium Hydroxide V.S. is the equivalent of:

	Gramme.
Potassium Hydroxide, KOH	0.0011222
Potassium Bitartrate, $KHC_4H_4O_6$	0.0037628
Sulphuric Acid, H_2SO_4	0.0009809

Hundredth-Normal Potassium Hydroxide Volumetric Solution

$KOH = 56.11$ 0.5611 Gm. in 1000 mils

Dilute 10 mils of normal or preferably 100 mils of tenth-normal potassium hydroxide V.S., at standard temperature, with sufficient recently boiled distilled water at the same temperature to measure exactly 1000 mils. Verify the titer of this solution by titrating 0.0941 Gm. of potassium bitartrate (see page 543), which should require for neutralization exactly 50 mils of the volumetric solution at standard temperature. This solution must be frequently renewed.

One Mil of Hundredth-Normal Potassium Hydroxide V.S. is the equivalent of:

	Gramme.
Potassium Hydroxide, KOH	0.0005611
Potassium Bitartrate, $KHC_4H_4O_6$	0.0018814
Sulphuric Acid, H_2SO_4	0.00049045

Half-Normal Alcoholic Potassium Hydroxide Volumetric Solution

KOH = 56.11 28.055 Gm. in 1000 mils

Dissolve from 2 to 3 Gm. of silver nitrate in 5 mils of distilled water and add the solution to 1200 mils of alcohol (*Alcohol,* U.S.P.) in a glass-stoppered bottle, and mix thoroughly. Dissolve about 5 Gm. of potassium hydroxide (see page 338) in 25 mils of warm alcohol, cool the solution, and pour it slowly without stirring, into the alcoholic solution of silver nitrate. Let the mixture stand until the precipitated silver oxide has settled, filter and distil. Dissolve about 35 Gm. of potassium hydroxide (see page 338) in 20 mils of distilled water and add sufficient alcohol, purified as directed above, to measure 1000 mils. Let the solution stand in a glass-stoppered or rubber-stoppered bottle for one day, then quickly decant the clear, supernatant solution into a bottle provided with a well-fitted rubber stopper. Into a flask of the capacity of about 300 mils introduce 2.3518 Gm. of potassium bitartrate, which has been purified and dried, as directed on page 543, and about 100 mils of distilled water. Heat the solution to the boiling point, add about 5 drops of phenolphthalein T.S., then run in cautiously at standard temperature from a burette the potassium hydroxide solution prepared as above, keeping the liquid hot and frequently agitating the flask, and, toward the end of the operation, reducing the flow to drops until the red color produced by its influx no longer disappears on shaking, and the liquid is not deeper than pale pink. Note the number of mils of the alcoholic potassium hydroxide solution consumed, and then dilute the remainder of the solution with alcohol purified as directed above, so that exactly 25 mils of the diluted liquid, at standard temperature, shall be required to neutralize 2.3518 Gm. of potassium bitartrate.

Half-normal alcoholic potassium hydroxide V.S. may also be standardized as follows: Of the above described concentrated alcoholic potassium hydroxide solution, carefully measure, at standard temperature, from a burette 30 mils into a flask, and, after diluting with about 50 mils of distilled water, add about 5 drops of phenolphthalein T.S., heat to boiling temperature, and add from a burette half-normal hydrochloric acid V.S., at standard temperature, frequently agitating the flask, and, toward the end of the operation, reducing the flow to drops until the red color of the liquid is just discharged. Note the number of mils of the half-normal hydrochloric acid V.S. consumed, and then dilute the remainder of the solution with the purified alcohol so that 25 mils of this and 25 mils of half-normal hydrochloric acid V.S., at standard temperature, neutralize each other. Should half-normal hydrochloric acid V.S. not be available, standardization can be carried out in the same manner with normal hydrochloric acid V.S., two volumes of the alcoholic potassium hydroxide being made to correspond with one volume of the normal acid.

Note: This solution should be kept in bottles provided with well-fitted rubber stoppers and protected from the light. Owing to the readiness with which this standard solution loses its titer blank tests should be performed whenever it is employed in titrations. It is important that this volumetric solution be standardized at the temperature at which it is used.

One Mil of Half-Normal Alcoholic Potassium Hydroxide V.S. is the equivalent of:

	Gramme.
Potassium Hydroxide, KOH	0.028055
Borneol, $C_{10}H_{18}O$	0.07707
Bornyl Acetate, $C_{10}H_{17}.C_2H_3O_2$	0.09808
Menthol, $C_{10}H_{20}O$	0.07808
Menthyl Acetate, $C_{10}H_{19}.C_2H_3O_2$	0.09909
Methyl Salicylate, $CH_3.C_7H_5O_3$	0.07603
Potassium Bitartrate, $KHC_4H_4O_6$	0.09407
Santalol, $C_{15}H_{26}O$	0.111105

Tenth-Normal Potassium Permanganate Volumetric Solution

$KMnO_4 = 158.03$ 3.1606 Gm. in 1000 mils

Introduce about 3.3 Gm. of crystallized potassium permanganate (*Potassii Permanganas*, U.S.P.) into a flask, add 1000 mils of distilled water, and boil for about five minutes. Close the flask with a plug of purified absorbent cotton, and set it aside for at least two days, so that suspended matter may deposit. After the lapse of this time, pour off the clear portion of the solution into a glass-stoppered bottle. The water to be employed for diluting this solution (which is still too concentrated) should be prepared as directed under distilled water (*Aqua Destillata*, U.S.P.), adding, however, about 1 Gm. of potassium permanganate to each liter of water in the retort before beginning the distillation.

The solution may be standardized as follows:

I. Introduce about 0.3 Gm. of sodium oxalate (see page 549), previously dried to constant weight at 110° C. and accurately weighed, into a beaker of about 400 mils capacity. Dissolve the salt in 250 mils of distilled water, heated to 85° C. and add 5 mils of concentrated sulphuric acid (see page 552) diluted with an equal volume of distilled water. To this solution, kept at 85° C., add, from a burette, the permanganate solution to be standardized, stirring vigorously and continually with a thermometer, the solution being added not faster than at the rate of from 10 to 15 mils per minute. The last 0.5 to 1 mil of the solution required must be added, drop by drop, with particular care to see that each drop is fully decolorized before introducing the next. When the solution has assumed a faintly pink tint (remaining permanent for thirty seconds), the titration should cease. The excess of permanganate solution required to cause an end-point color must be estimated by matching the color of the liquid being tested with a measured quantity of the same permanganate solution in another beaker containing the same volumes of hot distilled water and sulphuric acid. Note the number of mils of the permanganate solution consumed in the trial titration and deduct from this volume the amount of permanganate solution required to produce the same tint in the water and acid mixture; the difference represents the number of mils of the permanganate solution required to reach the exact end-point in the trial titration.

Each 0.0067 Gm. of sodium oxalate is equivalent to 1 mil of tenth-normal potassium permanganate V.S. The number of grammes of sodium oxalate taken, when multiplied by 149.2537, indicates the number of mils of tenth-normal potassium permanganate V.S. required. The solution may now be adjusted to exactly tenth-normal strength or the factor may be determined and the solution employed empirically. In the former instance note the number of mils of the trial permanganate solution consumed, then dilute it so that the volume of diluted solution corresponds to that obtained by calculation from the sodium oxalate taken.

EXAMPLE: Assuming that 0.25 Gm. of sodium oxalate was taken, and 35.2 mils of the trial potassium permanganate solution was consumed. Then 0.25 × 149.2537 = 37.313, and therefore 35.2 mils (or 352 mils) of the trial potassium permanganate solution are diluted to 37.3 mils (or 373.13 mils). The factor of this trial solution for use as an empirical solution may be determined by dividing the number of mils of the trial permanganate solution consumed, by the number of mils representing the true equivalent volume (product of 149.2537 × the grammes of sodium oxalate used). 37.313 ÷ 35.2 = 106.00, which is the percentage strength of the solution based upon the true tenth-normal V.S.

II. Tenth-normal potassium permanganate V.S. may also be standardized as follows:

To a solution of about 1 Gm. of potassium iodide (*Potassii Iodidum,* U.S.P.) in 10 mils of diluted sulphuric acid contained in a flask, slowly add from a burette 25 mils of the potassium permanganate solution to be standardized; mix well, then dilute the mixture at once with about 200 mils of distilled water. Add slowly an accurately standardized tenth-normal sodium thiosulphate V.S. from a burette, shaking the mixture vigorously, until the liquid is but slightly yellow, then add a few drops of starch T.S. and continue the addition of the tenth-normal sodium thiosulphate V.S. until the blue color is just discharged. Note the number of mils of the latter consumed, then dilute the permanganate solution so that 25 mils of the solution corresponds to 25 mils of the tenth-normal sodium thiosulphate V.S. under the same conditions at standard temperature. At least three careful titrations should be made, accepting the average, before diluting.

EXAMPLE: Assuming that 25 mils of the tenth-normal sodium thiosulphate V.S. was required to decolorize the iodine liberated by 20 mils of the permanganate solution, then each 20 mils of the potassium permanganate solution remaining must be diluted with the specially prepared distilled water to 25 mils, or the whole of the remaining solution in the same proportion. Thus, if 920 mils remain, it should be diluted, at standard temperature, to measure 1150 mils. After the potassium permanganate solution is thus diluted, a new trial should be made in the manner above described, in which 25 mils of this solution should require exactly 25 mils of the tenth-normal sodium thiosulphate V.S. to decolorize the mixture.

NOTE: When potassium permanganate V.S. is to be prepared for immediate use, this may be done as follows: Dissolve about 3.3 Gm. of crystallized potassium permanganate in 1000 mils of recently boiled and cooled distilled water. Then standardize this by either of the above methods and dilute accordingly with recently boiled and cooled distilled water. Potassium permanganate V.S. made by this method, without the preliminary boiling and standing, deteriorates readily, hence the titer should be verified each time it is used. Potassium permanganate V.S. should be kept in well-closed glass-stoppered bottles, and burettes provided with glass stop-cocks must be employed in titrating with it. This solution should be restandardized frequently.

One Mil of Tenth-Normal Potassium Permanganate V.S. is the equivalent of:

	Gramme.
Potassium Permanganate, $KMnO_4$	0.0031606
Calcium Oxide, CaO (as oxalate)	0.0028035
Ferrous Carbonate, $FeCO_3$	0.011584
Ferrous Oxide, FeO	0.007184
Ferrous Sulphate, anhydrous, $FeSO_4$	0.015191
Ferrous Sulphate, crystals, $FeSO_4 + 7H_2O$	0.027802
Hydrogen Dioxide, H_2O_2	0.0017008
Iron, in ferrous compounds, Fe	0.005584
Oxalic Acid, crystallized, $H_2C_2O_4 + 2H_2O$	0.0063025
Oxygen, O	0.0008
Potassium Chlorate, $KClO_3$	0.0020427
Sodium Chlorate, $NaClO_3$	0.0017743
Sodium Nitrite, $NaNO_2$	0.0034505
Sodium Oxalate, $Na_2C_2O_4$	0.0067

Tenth-Normal Potassium Sulphocyanate Volumetric Solution

[VOLHARD'S SOLUTION]

$KCNS = 97.18$ 9.718 Gm. in 1000 mils

Dissolve 11 Gm. of crystals of potassium sulphocyanate (see page 546) in 1000 mils of distilled water.

This solution is too concentrated and has to be adjusted so as to correspond in strength exactly with tenth-normal silver nitrate V.S. For this purpose, introduce into a flask 10 mils of tenth-normal silver nitrate V.S., 3 mils of ferric ammonium sulphate T.S., and 3 mils of nitric acid (free from nitrous compounds) and dilute the liquid with about 100 mils of distilled water. To this mixture add the sulphocyanate solution from a burette in small portions at a time. At first, a white precipitate of silver sulphocyanate appears, then every drop falling from the burette is surrounded by a deep brownish-red color produced by ferric sulphocyanate which disappears on vigorous shaking of the flask as long as any of the silver nitrate remains unchanged. When all of the silver has been converted into sulphocyanate, a single additional drop of the potassium sulphocyanate solution produces a brownish-red color which no longer disappears on shaking, but communicates a perceptible pale reddish-brown tint to the contents of the flask. Note the number of mils of the potassium sulphocyanate solution used and, after having confirmed the accuracy of the titration, dilute the whole of the remaining solution so that equal volumes of this and of the tenth-normal silver nitrate V.S., at standard temperature, will be required to produce the permanent reddish-brown tint. (The same depth of pale reddish-brown tint to which the volumetric solution is adjusted must be attained when the solution is used for volumetric assays.) After the dilution, a new trial should be made, in which 25 mils of tenth-normal silver nitrate V.S., at standard temperature, 5 mils of ferric ammonium sulphate T.S., 5 mils of nitric acid, and 200 mils of distilled water are used, and there should be required of the potassium sulpho-cyanate solution, exactly the same number of mils as of the silver nitrate solution, at standard temperature, to produce the same depth of a permanent pale reddish-brown tint. If necessary a new adjustment should be made to render the correspondence perfect.

One Mil of Tenth-Normal Potassium Sulphocyanate V.S. is the equivalent of:

	Gramme.
Potassium Sulphocyanate, KSCN	0.009718
Mercuric Iodide, HgI_2	0.022722
Mercuric Nitrate, $Hg(NO_3)_2$	0.016231
Mercuric Oxide, HgO	0.01083
Mercury, Hg	0.01003
Silver, Ag	0.010788
Silver Nitrate, $AgNO_3$	0.016989
Silver Oxide, Ag_2O	0.011588

Tenth-Normal Silver Nitrate Volumetric Solution

$AgNO_3 = 169.89$ 16.989 Gm. in 1000 mils

Into a flask containing 10.788 Gm. of silver (see page 546), and provided with a small funnel inserted into the neck to prevent loss by spurting, introduce gradually about 30 mils of nitric acid (*Acidum Nitricum*, U.S.P.) or sufficient for complete solution. After thoroughly rinsing the funnel inside and outside, transfer the solution, which should be clear, with the rinsings of the flask to a beaker or porcelain dish and evaporate it to dryness on a water bath, carefully protecting the vessel from dust. Then after drying in an air-oven at about 120° C. for ten minutes, dissolve the residue in sufficient distilled water to measure exactly 1000 mils at standard temperature. Keep the solution in dark amber-colored, glass-stoppered vials, carefully protected from dust and sunlight.

Note: Titration by tenth-normal silver nitrate V.S. may be conducted in various ways, adapted to the special preparation to be tested.

A. The titration of soluble chlorides and bromides.—To the strictly neutral (to litmus) solution of an accurately weighed quantity of the salt contained in either a porcelain dish or a flask placed on a white surface add sufficient potassium chromate T.S. to impart a yellow tint, then slowly add the tenth-normal silver nitrate V.S. from a burette, stirring or agitating constantly until the mixture acquires a permanent red tint, due to the formation of red silver chromate. This method is only suitable for neutral solutions.

B. The titration of free hydrobromic, hydrochloric, and hydriodic acids or their salts in acid solution, known as the Volhard, Thiocyanate, or Sulphocyanate method of residual titration.—Add an accurately measured excess of tenth-normal silver nitrate V.S. to the solution of the halogen acid or its salt, and then acidify with nitric acid, and add a few mils of ferric ammonium sulphate T.S.; then determine the uncombined excess of the silver nitrate V.S. by titrating back with tenth-normal potassium sulphocyanate V.S., the end-reaction being the formation of a permanent pale reddish tint. The volume of the silver nitrate V.S. originally added, less that of the potassium sulphocyanate V.S. consumed, will give the number of mils of the former which were required for the precipitation of the halogen. The quantity of nitric acid added should be sufficient to remove the yellow color produced by the addition of the indicator.

C. Titration until the first appearance of a permanent precipitate.—This method is applicable in the estimation of the alkali cyanides and hydrocyanic acid. When the solution is used by this method, it is a fifth-normal instead of a tenth-normal solution.

One Mil of Tenth-Normal Silver Nitrate V.S. is the equivalent of:

	Gramme.
Silver Nitrate, $AgNO_3$	0.016989
Allyl Iso-thiocyanate, $C_3.H_5SCN$	0.004956
Ammonium Bromide, NH_4Br	0.009796
Ammonium Chloride, NH_4Cl	0.005350
Ammonium Iodide, NH_4I	0.014496
Arsenous Iodide, AsI_3	0.015191
Bromine, Br	0.007992
Calcium Bromide, anhydrous, $CaBr_2$	0.0099955
Calcium Bromide, $CaBr_2+2H_2O$	0.0011798
Calcium Chloride, anhydrous, $CaCl_2$	0.00555
Calcium Chloride, $CaCl_2+2H_2O$	0.0073511
Calcium Hypophosphite, $Ca(PH_2O_2)_2$	0.002836
Chlorine, Cl	0.003546
Ferrous Bromide, anhydrous, $FeBr_2$	0.010784
Ferrous Iodide, FeI_2	0.015484
Hydriodic Acid, HI	0.012793
Hydrobromic Acid, HBr	0.008093
Hydrochloric Acid, HCl	0.003647
Hydrocyanic Acid, HCN, to first formation of precipitate	0.005404
Hydrocyanic Acid, HCN, potassium chromate as indicator	0.002702
Iodine, I	0.012692
Lithium Bromide, LiBr	0.008686
Lithium Chloride, LiCl	0.004240
Phosphoric Acid, H_3PO_4	0.0032687
Potassium Bromide, KBr	0.011902
Potassium Chloride, KCl	0.007456
Potassium Cyanide, KCN, to first formation of precipitate	0.013022
Potassium Hypophosphite, KPH_2O_2	0.003472
Potassium Iodide, KI	0.016602
Potassium Nitrate, KNO_3	0.010111
Potassium Sulphocyanate, KCNS	0.009718
Sodium Bromide, NaBr	0.010292
Sodium Chloride, NaCl	0.005846
Sodium Cyanide, NaCN, to first formation of precipitate	0.009802
Sodium Hypophosphite, $NaPH_2O_2+H_2O$	0.0035357
Sodium Iodide, NaI	0.014992
Sodium Nitrate, $NaNO_3$	0.008501
Sodium Phosphate, anhydrous, Na_2HPO_4	0.004735
Sodium Phosphate, crystallized, $Na_2HPO_4+12H_2O$	0.011941
Strontium Bromide, $SrBr_2+6H_2O$	0.017779
Strontium Chloride, $SrCl_2+6H_2O$	0.013332
Strontium Iodide, SrI_2+6H_2O	0.022479
Zinc Chloride, $ZnCl_2$	0.0068145

Hundredth-Normal Silver Nitrate Volumetric Solution

$AgNO_3=169.89$ 1.6989 Gm. in 1000 mils

Dilute, at standard temperature, exactly 100 mils of tenth-normal silver nitrate V.S. with sufficient distilled water at the same temperature to measure 1000 mils.

This solution should be kept in glass-stoppered, amber-colored bottles which have been rinsed with nitric acid and then with hot distilled water until all traces of the acid have been removed.

One Mil of Hundredth-Normal Silver Nitrate V.S. is the equivalent of:

	Gramme.
Sodium Chloride, $NaCl$	0.0005846

Tenth-Normal Sodium Chloride Volumetric Solution

$NaCl = 58.46$ 5.846 Gm. in 1000 mils

Dissolve 5.846 Gm. of sodium chloride (see page 518) in sufficient distilled water to measure exactly 1000 mils at standard temperature.

Tenth-normal sodium chloride V.S. should correspond, volume for volume, with tenth-normal silver nitrate V.S., by titrating 20 mils of the former with the latter, using potassium chromate as indicator.

One Mil of Tenth-Normal Sodium Chloride V.S. is the equivalent of:

	Gramme.
Sodium Chloride, $NaCl$	0.005846
Silver, Ag	0.010788
Silver Nitrate, $AgNO_3$	0.016989
Silver Oxide, Ag_2O	0.011588

Double-Normal Sodium Hydroxide Volumetric Solution

$NaOH = 40.01$ 80.02 Gm. in 1000 mils

Dissolve 90 Gm. of sodium hydroxide (*Sodii Hydroxidum,* U.S.P.) in sufficient recently boiled distilled water to measure about 1000 mils.

For the standardization of this trial solution of sodium hydroxide proceed as directed under normal potassium hydroxide V.S. (see page 563); each 25 mils of the volumetric solution, at standard temperature, should exactly neutralize 9.407 Gm. of potassium bitartrate (see page 543) or 50 mils of normal sulphuric acid V.S. (see page 575).

NOTE: The same precautions should be taken for protecting this solution from the carbon dioxide of the air as are prescribed for normal potassium hydroxide V.S. (see page 563).

Normal Sodium Hydroxide Volumetric Solution

$NaOH = 40.01$ 40.01 Gm. in 1000 mils

Dissolve 50 Gm. of sodium hydroxide (*Sodii Hydroxidum,* U.S.P.) in sufficient recently boiled distilled water to measure about 1050 mils. For the standardization of this trial solution of sodium hydroxide, proceed as directed under normal potassium hydroxide V.S. (see page 563); 25 mils of the volumetric solution, at standard temperature, must exactly neutralize 4.7035 Gm. of potassium bitartrate or 25 mils of normal sulphuric acid V.S. (see page 575).

NOTE: The same precautions should be taken for protecting this solution from the carbon dioxide of the air as are prescribed for normal potassium hydroxide V.S. (see page 563). This solution may be employed in place of the normal potassium hydroxide V.S. (see page 563), volume for volume.

One Mil of Normal Sodium Hydroxide V.S. is the equivalent of:

	Gramme.
Sodium Hydroxide, NaOH	0.04001
Boric Acid, H_3BO_3	0.06202
Formaldehyde, CH_2O	0.03002
Trichloracetic Acid, $HC_2O_2Cl_3$	0.16339

Tenth-Normal Sodium Thiosulphate Volumetric Solution

$Na_2S_2O_3+5H_2O=248.22$ 24.822 Gm. in 1000 mils

Dissolve 30 Gm. of sodium thiosulphate (see page 550) in sufficient distilled water, previously boiled for twenty minutes in a flask of hard glass and quickly cooled, to measure 1000 mils. This trial solution, which is too concentrated, is standardized as follows:

To 25 mils of tenth-normal potassium dichromate V.S., accurately measured, at standard temperature, into a glass-stoppered flask of about 500 mils capacity, add about 2 Gm. of potassium iodide (*Potassii Iodidum*, U.S.P.) (free from iodate), followed by 10 mils of diluted sulphuric acid. Rinse the walls of the flask cautiously with about 200 mils of cold distilled water poured in carefully so as not to mix, thus protecting the lower layer from loss of iodine. Stopper the flask securely and set it aside for half an hour in a dark place, then carefully rinse the stopper and sides of the flask with distilled water and add slowly the trial solution of sodium thiosulphate, at standard temperature, while rotating the flask gently. When the solution has assumed a yellowish-green color, add starch T.S. and then reduce the flow of the sodium thiosulphate solution to drops, constantly shaking until the blue color of the mixture changes to a light green; note the number of mils of the trial sodium thiosulphate solution consumed. Then dilute the sodium thiosulphate solution with distilled water which has been previously boiled for twenty minutes so that equal volumes of it and the tenth-normal potassium dichromate V.S. will exactly correspond to each other under the above conditions, at standard temperature.

Note: The same precautions should be taken for keeping and protecting this solution from the carbon dioxide of the air as are directed under normal potassium hydroxide V.S. (see page 563).

One Mil of Tenth-Normal Sodium Thiosulphate V.S. is the equivalent of:

	Gramme.
Sodium Thiosulphate $Na_2S_2O_3+5H_2O$	0.024822
Bromine, Br	0.007992
Chlorine, Cl	0.003546
Chromium Trioxide, CrO_3	0.003333
Copper Sulphate, anhydrous, $CuSO_4$	0.015964
Copper Sulphate, crystallized, $CuSO_4+5H_2O$	0.024972
Iodine, I	0.012692
Iodine, I (Thymol Iodide)	0.002115
Iron, Fe, in ferric salts	0.005584
Lead Peroxide, PbO_2	0.01195
Potassium Bromate, $KBrO_3$	0.0027837
Potassium Dichromate, $K_2Cr_2O_7$	0.0049033
Sodium Arsenate, anhydrous, Na_2HAsO_4	0.0092985
Sodium Arsenate, crystallized, $Na_2HAsO_4+7H_2O$	0.015604

Two-Hundredth-Normal Sodium Thiosulphate Volumetric Solution

$Na_2S_2O_3+5H_2O=248.22$ 1.2411 Gm. in 1000 mils

Dilute exactly 25 mils, at standard temperature, of tenth-normal sodium thiosulphate V.S. with sufficient distilled water at the same temperature and recently boiled for twenty minutes to measure 500 mils. If desired, this solution may be standardized in the manner described under tenth-normal sodium thiosulphate V.S. (see page 574), employing 5 mils of tenth-normal potassium dichromate V.S. which should require for the decolorization of the liberated iodine, 100 mils of the two-hundredth-normal sodium thiosulphate V.S. The same precautions should be observed in the preservation of this solution as directed under tenth-normal sodium thiosulphate V.S.

One Mil of Two-Hundredth-Normal Sodium Thiosulphate V.S. is the equivalent of:

	Gramme.
Sodium Thiosulphate, $Na_2S_2O_3+5H_2O$	0.0012411
Iodine, I	0.0006346
Iodine, I (from Thyroid Glands)	0.0001058

Normal Sulphuric Acid Volumetric Solution

$H_2SO_4=98.09$ 49.045 Gm. in 1000 mils

Carefully mix 30 mils of pure, concentrated sulphuric acid (*Acidum Sulphuricum*, U.S.P.) with sufficient distilled water to measure about 1050 mils, and allow the liquid to cool to 25° C. Measure from a burette 25 mils of this liquid (which is yet too concentrated) into a flask, add about 50 mils of distilled water and 2 drops of methyl orange T.S. and afterwards, from a burette, a freshly standardized normal potassium hydroxide V.S., shaking after each addition, and toward the end of the operation reducing the flow to drops, until the red tint of the solution changes to a permanent pale yellow after thorough shaking. Note the number of mils of normal potassium hydroxide V.S. consumed. Then dilute the sulphuric acid solution so that equal volumes of this and of normal potassium hydroxide V.S., at standard temperature, exactly neutralize each other.

Alternative Method.—The diluted trial acid may be directly standardized as follows: Weigh accurately about 2 Gm. of anhydrous sodium carbonate (prepared as directed on page 548), dissolve it in 100 mils of distilled water contained in a flask, add from 2 to 3 drops of methyl orange T.S., then run in, little by little, from a burette the acid solution to be standardized. Agitate the flask after each addition, reducing the flow of the acid to drops toward the end of the titration; the termination of the operation or exact saturation is indicated by a change in the color of the solution from orange to red or pink. A second or third trial should be made with other weighed portions of the sodium carbonate and in each experiment the number of mils consumed should be accurately noted and the results should agree closely. One gramme of anhydrous sodium carbonate requires for exact neutralization 18.868 (18.8679) mils of normal sulphuric acid V.S. at standard temperature.

Example: 2.25 Gm. of anhydrous sodium carbonate required 37.6 mils of the trial acid for neutralization,* then:

$$42.453 : 37.6 :: 100 : x \quad x=88.57 \text{ mils}$$

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* 2.25 Gm. of anhydrous sodium carbonate requires 2.25×18.868=42.4528 mils of normal sulphuric acid V.S.

In a second trial 2.12 Gm. of the soda required 35.43 mils of the trial acid for neutralization, then:

$$40.00 : 35.43 :: 100 : x \quad x = 88.575$$

The acid may now be adjusted by measuring 885.72 mils (average) into a graduated liter flask and filling to the liter mark with distilled water at standard temperature. A new adjustment must be made to prove the accuracy of the standardization, using about 3 Gm., accurately weighed, of the sodium carbonate.

One Mil of Normal Sulphuric Acid V.S. is the equivalent of:

	Gramme.
Sulphuric Acid, H_2SO_4	0.049045
Ammonia Gas, NH_3	0.01703
Ammonium Acetate, $NH_4C_2H_3O_2$	0.07707
Ammonium Carbonate, $(NH_4)_2CO_3$	0.04804
Ammonium Carbonate (U.S.P.), $NH_4HCO_3.NH_4NH_2CO_2$	0.052373
Calcium Hydroxide, $Ca(OH)_2$	0.037045
Calcium Oxide, CaO	0.028035
Lead Acetate, crystallized, $Pb(C_2H_3O_2)_2+3H_2O$	0.18960
Lead Subacetate, assumed as $Pb_2O(C_2H_3O_2)_2$	0.13706
Lithium Carbonate, Li_2CO_3	0.03694
Lithium Salicylate, $LiC_7H_5O_3$	0.14398
Magnesium Carbonate, $(MgCO_3)_4\ Mg(OH)_2+5H_2O$	0.04857
Magnesium Oxide, MgO	0.02016
Potassium Acetate, $KC_2H_3O_2$	0.09812
Potassium Bicarbonate, $KHCO_3$	0.10011
Potassium Bitartrate, $KHC_4H_4O_6$	0.18814
Potassium Carbonate, anhydrous, K_2CO_3	0.06910
Potassium Citrate, crystallized, $K_3C_6H_5O_7+H_2O$	0.10812
Potassium Hydroxide, KOH	0.05611
Potassium and Sodium Tartrate, $KNaC_4H_4O_6+4H_2O$	0.14110
Sodium Acetate, $NaC_2H_3O_2+3H_2O$	0.13607
Sodium Bicarbonate, $NaHCO_3$	0.08401
Sodium Borate, crystallized, $Na_2B_4O_7+10H_2O$	0.19108
Sodium Carbonate, anhydrous, Na_2CO_3	0.0530
Sodium Carbonate, monohydrated, $Na_2CO_3+H_2O$	0.06201
Sodium Hydroxide, $NaOH$	0.04001
Sodium Salicylate, $NaC_7H_5O_3$	0.16001
Zinc Oxide, ZnO	0.040685

Half-Normal Sulphuric Acid Volumetric Solution

$H_2SO_4 = 98.09$ 24.5225 Gm. in 1000 mils

Dilute 500 mils of normal sulphuric acid V.S. at standard temperature with sufficient distilled water at the same temperature to measure 1000 mils.

This standard solution is chiefly employed in the titration of the organic salts of sodium and potassium in conjunction with methyl orange T.S. as indicator. For this purpose a special experiment should be made in which an accurately measured volume of 10 mils of normal potassium hydroxide V.S. should, after adding 2 drops of methyl orange T.S., require exactly 20 mils of the half-normal sulphuric acid V.S., at standard temperature, for neutralization. If necessary, an adjustment should be made to render the correspondence perfect.

One Mil of Half-Normal Sulphuric Acid V.S. is the equivalent of:

	Gramme.
Sulphuric Acid, H_2SO_4	0.024523
Ammonia Gas, NH_3	0.008515
Lithium Citrate, anhydrous	0.034977
Lithium Citrate, crystallized, $Li_3C_6H_5O_7+4H_2O$	0.04699
Lithium Salicylate, $LiC_7H_5O_3$	0.07199
Potassium and Sodium Tartrate, anhydrous, $KNaC_4H_4O_6$	0.05253
Potassium and Sodium Tartrate, crystallized, $KNaC_4H_4O_6+4H_2O$	0.07055
Potassium Acetate, $KC_2H_3O_2$	0.04906
Potassium Bicarbonate, $KHCO_3$	0.050055
Potassium Bitartrate, $KHC_4H_4O_6$	0.09407
Potassium Citrate, anhydrous, $K_3C_6H_5O_7$	0.051057
Potassium Citrate, crystallized, $K_3C_6H_5O_7+H_2O$	0.05406
Potassium Hydroxide, KOH	0.02806
Sodium Acetate, anhydrous, $NaC_2H_3O_2$	0.04101
Sodium Acetate, $NaC_2H_3O_2+3H_2O$	0.068035
Sodium Benzoate, $NaC_7H_5O_2$	0.07202
Sodium Bicarbonate, $NaHCO_3$	0.04200
Sodium Carbonate, anhydrous, Na_2CO_3	0.02650
Sodium Carbonate, monohydrated, $Na_2CO_3+H_2O$	0.031005
Sodium Citrate, anhydrous, $Na_3C_6H_5O_7$	0.04301
Sodium Citrate, crystallized, $Na_3C_6H_5O_7+2H_2O$	0.04901
Sodium Salicylate, $NaC_7H_5O_3$	0.08002
Sodium Tartrate, neutral, $Na_2C_4H_4O_6+2H_2O$	0.057515

Tenth-Normal Sulphuric Acid Volumetric Solution

$H_2SO_4 = 98.09$ 4.9045 Gm. in 1000 mils

Dilute 100 mils of normal sulphuric acid, at standard temperature, with sufficient distilled water at the same temperature to measure 1000 mils.

ALTERNATIVE METHOD.—Mix about 5 mils of concentrated sulphuric acid (specific gravity 1.826 at 25° C.) with sufficient distilled water to measure about 1100 mils, and allow it to cool to 25° C. Standardization should be carried out as directed under the alternative method for normal sulphuric acid V.S. (see page 575), employing about 0.3 Gm. of anhydrous sodium carbonate (see page 548), accurately weighed, with methyl orange T.S. as indicator. One decigramme of anhydrous sodium carbonate should require for neutralization 18.868 (18.8679) mils of the tenth-normal acid V.S. at standard temperature. This standard solution is employed in conjunction with the fiftieth-normal potassium hydroxide V.S. in the titration of alkaloids, with cochineal, iodeosin, methyl red, or hematoxylin T.S. as indicator. For this purpose a special experiment should be made, in which an accurately measured volume of 10 mils of the tenth-normal sulphuric acid, after adding a sufficient quantity of the indicator to be employed, should require 50 mils of the fiftieth-normal potassium hydroxide V.S. at standard temperature for complete neutralization.

One Mil of Tenth-Normal Sulphuric Acid V.S. is the equivalent of:

	Gramme.
Sulphuric Acid, H_2SO_4	0.0049045
Aconite, ether soluble alkaloids	0.0645
Aconitine, $C_{34}H_{47}O_{11}N$	0.064539
Atropine, $C_{17}H_{23}O_3N$	0.028919
Brucine, $C_{23}H_{26}O_4N_2$	0.039423
Calcium Hydroxide, $Ca(OH)_2$	0.0037045
Cephaeline, $C_{14}H_{19}O_2N$	0.023316
Cinchonidine, $C_{19}H_{22}ON_2$	0.029420
Cinchonine, $C_{19}H_{22}ON_2$	0.029420
Cocaine, $C_{17}H_{21}O_4N$	0.030318
Coniine, $C_8H_{17}N$	0.012715
Emetine, $C_{15}H_{21}O_2N$	0.024718
Hydrastine, $C_{21}H_{21}O_6N$	0.038318
Ipecac, Ether Soluble Alkaloids of	0.0240
Morphine, anhydrous, $C_{17}H_{19}O_3N$	0.028516
Morphine, crystallized, $C_{17}H_{19}O_3N + H_2O$	0.030318
Mydriatic Alkaloids, Combined	0.02892
Nux Vomica, Combined Alkaloids of	0.0364
Physostigmine, $C_{15}H_{21}O_2N_3$	0.027520
Pilocarpine, $C_{11}H_{16}O_2N_2$	0.020815
Potassium Hydroxide, KOH	0.005611
Quinine, anhydrous, $C_{20}H_{24}O_2N_2$	0.032421
Sodium Carbonate, anhydrous, Na_2CO_3	0.00530
Strychnine, $C_{21}H_{22}O_2N_2$	0.033420
Zinc Oxide, ZnO	0.0040685

Fiftieth-Normal Sulphuric Acid Volumetric Solution

$H_2SO_4 = 98.09$ 0.9809 Gm. in 1000 mils

Dilute 20 mils of normal sulphuric acid V.S., or preferably 200 mils of tenth-normal sulphuric acid V.S., at 25° C., with sufficient distilled water at the same temperature to measure 1000 mils. The strength of this solution must be adjusted so that 25 mils of it will exactly neutralize 25 mils of a recently standardized fiftieth-normal potassium hydroxide V.S., at standard temperature, cochineal, iodeosin, methyl red, or hematoxylin T.S. being used as indicator.

One Mil of Fiftieth-Normal Sulphuric Acid V.S. is the equivalent of:

	Gramme.
Sulphuric Acid, H_2SO_4	0.0009809
Aconitine, $C_{34}H_{47}O_{11}N$	0.012907
Atropine, $C_{17}H_{23}O_3N$	0.0057838
Cinchona, Combined Alkaloids of	0.0061841
Cinchonidine, $C_{19}H_{22}ON_2$	0.005884

	Gramme.
Cinchonine, $C_{19}H_{22}ON_2$	0.005884
Cocaine, $C_{17}H_{21}O_4N$	0.0060636
Coniine, $C_8H_{17}N$	0.002543
Hydrastine, $C_{21}H_{21}O_6N$	0.0076636
Ipecac, Combined Alkaloids of	0.0048034
Morphine, anhydrous, $C_{17}H_{19}O_3N$	0.0057032
Morphine, crystallized, $C_{17}H_{19}O_3N+H_2O$	0.0060636
Physostigmine, $C_{15}H_{21}O_2N_3$	0.005504
Pilocarpine, $C_{11}H_{16}O_2N_2$	0.004163
Quinine, anhydrous, $C_{20}H_{24}O_2N_2$	0.0062842
Strychnine, $C_{21}H_{22}O_2N_2$	0.006684

Indicators

NOTE: Each test solution used as indicator must be examined as soon as prepared, and afterwards, from time to time, as to its neutrality. If necessary, it is brought, by the cautious addition of highly diluted sulphuric acid or of a very dilute solution of an alkali, to such a point that when three drops of it are added to 25 mils of distilled water, a few drops of a hundredth-normal acid or alkali V.S., respectively, will distinctly develop the appropriate tints. Test solutions are injured by exposure to light, and it is best to preserve them in dark amber-colored vials. Keep test papers in dark bottles.

Azolitmin.—A purified coloring matter from litmus. In very dark to black-violet scales or as a reddish-brown powder, slightly soluble in water, insoluble in alcohol or ether. To test its relative sensitiveness, prepare a solution of 0.1 Gm. of azolitmin in 40 mils of distilled water by the aid of a gentle heat, then add 10 mils of alcohol and filter the liquid when cold. To about 50 mils of distilled water, which has previously *been boiled* (to free it from dissolved carbonic acid) and quickly cooled, add 0.1 mil of the trial solution; the resulting bluish-red solution assumes at once a distinctly red color upon the addition of 3 drops of fiftieth-normal sulphuric acid V.S. and under the same conditions a bluish-violet color upon the addition of 0.5 mil of hundredth-normal sodium hydroxide V.S.

Azolitmin Test Solution.—Dissolve 1 Gm. of azolitmin in 80 mils of distilled water and 20 mils of alcohol in a flask and sterilize the solution by heating it in a current of steam for one hour.

Cochineal Test Solution.—Macerate 1 Gm. of unbroken cochineal (see page 117) during four days with 20 mils of alcohol and 60 mils of distilled water, then filter. The color of this test solution is turned violet by alkalies, and yellowish-red by acids. Cochineal T.S. is useful in titrating alkaloids, inorganic acids, ammonia, the alkalies, and alkaline earths. The presence of salts of iron, aluminum, or copper must be avoided. This indicator is useless for titrating organic acids.

Congo Red (Dianil Red, Kosmos Red Extra).—The sodium salt of benzidindiazo-bis-1-naphthylamine-4-sulphonic acid, $(C_6H_4N:N.C_{10}H_5(NH_2)SO_3Na)_2$. A brownish-red powder, readily soluble in warm water, yielding a blood-red solution; slightly soluble in cold water, insoluble in ether or chloroform. The addition of tannic acid T.S. to an aqueous solution (1 in 20) intensifies the color of congo red but causes no precipitation (reaction for *basic color*). The addition of 5 mils of stannous chloride T.S. to 10 mils of an aqueous solution of congo red (1 in 10), followed by agitation and warming on a water bath, produces a violet precipitate. When filtered, the colorless filtrate does not again assume its red color when exposed to the air (test for *azo-group*). The addition of a 15 per cent. solution of sodium hydroxide to an aqueous solution of congo red (1 in 200) produces no change. The addition of hydrochloric acid to an aqueous solution of this dye (1 in 200) produces a violet precipitate. Concentrated sulphuric acid dissolves congo red with a slate blue color and, upon the cautious addition of distilled water, a blue precipitate is produced.

Congo Red Test Solution.—Dissolve 0.5 Gm. of congo red in 90 mils of distilled water and add 10 mils of alcohol. Add 2 or 3 drops of congo red test solution to 100 mils of distilled water contained in a porcelain dish; the red color of this solution changes to violet upon the addition of one drop of fiftieth-normal sulphuric acid V.S., and again changes to red upon the further addition of one drop of fiftieth-normal potassium hydroxide V.S. (*relative sensitiveness*).

Hematoxylin (Hydroxybrasilin), $C_{16}H_{14}O_6 + 3H_2O$.—A crystalline substance derived from the heart-wood of *Hæmatoxylon Campechianum* Linné (Fam. *Leguminosæ*). Colorless to yellowish prisms; very slightly soluble in cold water or ether, readily soluble in hot water or alcohol. When exposed to light, hematoxylin acquires a red color and yields yellow solutions. In ammonia water or in carbonated or caustic alkali solutions it yields a purple solution. Keep hematoxylin and its solution protected from light and air. When dissolved in aqueous solutions of the following salts, hematoxylin develops the colors indicated: in alum solution a red color; in stannous chloride solution a rose color; in solutions of copper salts a greenish-gray color; and it gradually turns black in potassium dichromate solution.

Hematoxylin Test Solution.—Dissolve 0.02 Gm. of hematoxylin in 10 mils of alcohol. Use about 5 drops for each titration. This indicator assumes a yellow to orange color in acid solutions, and a violet to purple color in alkaline solutions. The titration is complete when the change in color remains permanent upon the addition of one drop of the volumetric solution after stirring the liquid.

Iodeosin (Tetraiodofluorescein), $C_{20}H_8I_4O_5$.—A scarlet, crystalline powder, soluble in alcohol with a deep red color and in ether with a yellowish-red color. It is insoluble in water containing a trace of hydrochloric acid. It is not suitable for use as an indicator unless a test solution prepared from it (see below) will stand the following test of sensitiveness: Into a well-rinsed, colorless, glass-stoppered flask, introduce 100 mils of distilled water containing 5 drops of iodeosin T.S. followed by about 30 mils of ether. Then add drop by drop from a burette hundredth-normal hydrochloric acid V.S., vigorously shaking it after the addition of each drop until the aqueous layer just becomes colorless. After the addition of 5 more drops of the iodeosin T.S. and again shaking, the aqueous layer does not acquire a pink color; should it do so, the color must be discharged upon the addition of 1 drop of hundredth-normal hydrochloric acid V.S. (test of *sensitiveness*).

Iodeosin Test Solution.—Dissolve 0.1 Gm. of iodeosin in 100 mils of alcohol. This indicator becomes colorless in acid solutions, changing to pink in alkaline solutions. Dilute the solution to be titrated with distilled water to about 100 mils, in a 200 mil flask, add 20 mils of ether and 5 drops of the iodeosin T.S., cork and shake it well. Then add the volumetric alkali solution gradually, shaking it well after each addition. The titration is complete when the lower aqueous solution retains a faint pink color after shaking thoroughly. For assaying alkaloidal residues, dissolve the latter in a measured excess of volumetric acid solution, and transfer the acid solution to a 200 mil flask, washing the container well with distilled water until the contents of the flask measure about 100 mils. Then proceed as above. Frequently a scum forms between the ethereal and aqueous layer, in which case this assumes a pink color before the latter.

Litmus Paper and Test Solution.—Exhaust powdered litmus with three separate and successive portions (each equal to about 4 times its weight) of boiling alcohol (which removes the undesirable color erythrolitmin), each extraction lasting for about one hour. After draining off the alcohol, digest the residue with about an equal weight of cold water and filter. (This blue solution, which contains some alkali, after being acidulated, may be used to make red litmus paper.) Finally, extract the residue with about 5 times its weight of boiling distilled water, and, after thoroughly cooling, filter. The addition of 1 drop of hundredth-normal acid or alkali V.S. to 50 mils of distilled water containing 5 drops of the indicator produces a distinct change in color. Preserve the filtrate, as a test solution, in wide-mouthed bottles stoppered with loose plugs of purified cotton so as to exclude dust but admit air. The latter must be free from acid or ammoniacal vapors. The blue color of litmus test solution is changed by acids to red, and this red color by the addition of alkalies is restored to blue.

Litmus Paper, Blue.—Impregnate with the test solution just described strips of white filter paper, and dry them by suspending them on lines of clean twine, in an atmosphere free from acid or ammoniacal vapors. This paper must quickly respond to a two hundred and fiftieth-normal acid V.S.

Litmus Paper, Red.—Prepare this with the same kind of paper and in the manner described under *Litmus Paper, Blue,* having added to the test solution used to impregnate the paper just sufficient of a highly diluted solution of hydrochloric acid to impart to it a faint red tint. Neither blue nor red litmus paper should have an intense color. Preserve the test paper in bottles, so as to exclude dust and acid or ammoniacal vapors. This paper must quickly respond to a two hundred and fiftieth-normal alkali V.S.

Methyl Orange (Helianthin, Orange III, Tropaeolin D., Dimethylaniline Orange). The sodium salt of paradimethylaminoazobenzene sulphonic acid, $(CH_3)_2-N-C_6H_4-N=N-C_6H_4.SO_3Na$.—An orange-yellow powder, readily soluble in hot water, the solution on cooling separating golden-yellow scales. Slightly soluble in cold water, yielding an orange-yellow solution. Insoluble in alcohol. An aqueous solution (1 in 500), upon the addition of hydrochloric acid, yields a red precipitate soluble in excess of the acid with a deep red color. The addition of calcium chloride T.S. to the aqueous solution of methyl orange (1 in 500) precipitates the insoluble calcium salt. The addition of solution of lead subacetate (*Liquor Plumbi Subacetatis,* U.S.P.) precipitates the coloring matter from an aqueous solution. Sulphuric acid dissolves methyl orange with a blood-red color.

Methyl Orange Test Solution.—Dissolve 1 Gm. of methyl orange (see above) in 1000 mils of distilled water. Excessive quantities of this indicator should be avoided in titration; from 1 to 3 drops are sufficient for a volume of from 50 to 100 mils, or add just enough to impart a faint tint to the solution, which if alkaline or neutral will assume a pure yellow, if faintly acid, an orange, and when strongly acid, a rose red color. The solution must comply with the following requirements for sensitiveness as an indicator: To 100 mils of distilled water, contained in a flask of Jena glass, add 1 drop of the Test Solution; the pale yellow color of the solution, upon the addition of 0.5 mil of hundredth-normal sulphuric acid V.S. changes to a rose color; the yellow color will be restored upon the further addition of 0.5 mil of hundredth-normal potassium hydroxide V.S. Methyl orange is suitable for titrating inorganic acids, alkalies, alkali carbonates or bicarbonates. It is not to be employed in titrating organic acids, nor in alcoholic or boiling solutions. This indicator gives a yellow color with alkalies and rose color with acids.

Methyl Red (Paradimethylaminoazobenzeneorthocarboxylic acid), $(CH_3)_2-N-C_6H_4-N=N-C_6H_4.COOH$.—Violet crystals, very slightly soluble in cold water, yielding a red solution, readily soluble in alcohol and glacial acetic acid. When dissolved in sulphuric acid, methyl red shows the same color change as methyl orange. The applications of methyl red as indicator are the same as those of methyl orange, except that when titrating solutions containing carbonates it should not be used (see above).

Methyl Red Test Solution.—Dissolve 0.2 Gm. of methyl red in 100 mils of alcohol. As an indicator from 1 to 3 drops are sufficient for a volume of 100 mils, or add just sufficient to impart a faint tint to the solution, which if alkaline will assume a pure yellow, and when faintly acid a rose-red, or when strongly acid a violet-red color. The solution must comply with the following requirements for sensitiveness as an indicator: To 100 mils of distilled water which has been freed from carbon dioxide by boiling in a flask of hard glass, add 2 drops of methyl red T.S.; the yellowish-red color of 50 mils of this solution is changed to pure yellow by the addition of 2 drops of hundredth-normal potassium hydroxide V.S., and the color of the other 50 mils is changed to red by 2 drops of hundredth-normal hydrochloric acid V.S. Methyl red T.S., which is not affected by neutral salts, may be used in all instances where methyl orange is indicated, except where carbon dioxide is present; its end-points are sharper than those of methyl orange and it is far more sensitive in the titration of very dilute solutions of weak bases, surpassing hematoxylin or iodeosin in the titration of alkaloids.

Phenolphthalein Test Solution.—Dissolve 1 Gm. of phenolphthalein (see page 317) in 100 mils of alcohol. About 3 drops are sufficient for 50 mils of the solution to be titrated; it gives a red color with alkali hydroxides or carbonates, and acids render the solution colorless. The test solution must comply with the following requirements for sensitiveness as an indicator: From 3 to 5 drops of the test solution are added to 300 mils of distilled water which has been previously boiled and cooled in a flask of Jena glass; this solution is colored red by the addition of not more than 0.5 mil of hundredth-normal potassium hydroxide V.S. Phenolphthalein may be employed in hot titrations. It is not suitable as an indicator for ammonia nor in the presence of large quantities of ammonium salts, but is largely used for organic acids, alkali hydroxides, and for carbonates and bicarbonates in boiling solutions.

Phenolphthalein Paper is prepared by impregnating white, unsized paper with the test solution and drying it.

Rosolic Acid, Corallin.—Amorphous reddish-brown powder or lumps, the latter having a greenish, metallic luster, consisting chiefly of the compound $C_{20}H_{16}O_3$, isomeric with methylaurin and homologous with aurin. Rosolic acid is soluble in alcohol and insoluble in water.

Rosolic Acid Test Solution.—Dissolve 1 Gm. of rosolic acid in 10 mils of diluted alcohol, and add enough distilled water to make 100 mils. Of this solution, about 0.5 mil is used for 100 mils of solution to be titrated. Its color is pale yellow, unaffected by acids, but turning to rose with alkalies. The solution must comply with the following requirements for sensitiveness as an indicator: To 100 mils of distilled water, add 2 drops of the test solution; the pale yellow color of this solution, upon the addition of 0.5 mil of hundredth-normal potassium hydroxide V.S., changes to a rose-red; the yellow color will be restored upon the further addition of 0.5 mil of hundredth-normal sulphuric acid V.S. Ammoniacal solutions are to be highly diluted when titrated with this indicator. It is useful for mineral but useless for organic acids, except oxalic.

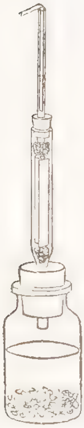
Turmeric Tincture.—Digest any convenient quantity of ground turmeric root (from *Curcuma longa* Linné, Fam. *Scitaminaceæ*) repeatedly with small quantities of distilled water and discard the liquids. Then digest the dried residue for several days with six times its weight of alcohol, and filter.

Turmeric Paper.—Impregnate white, unsized paper with the tincture, and dry it. The tincture, as well as the paper, turns brown with alkalies, and the original yellow color is restored by acids, with the exception of boric acid, which, especially in the presence of hydrochloric acid, turns the color to reddish-brown, which is changed to bluish-black by ammonia.

General Tests

Under this head are placed tests which are frequently duplicated throughout this Pharmacopœia. In order to save space they are here grouped together and in the text are referred to by number.

1. Arsenic Test



Test Apparatus.—Prepare several generators, equipped with tubes, etc., as described below. Select as a generator a bottle of about 50 mils capacity, having a mouth about 2.5 cm. in diameter and provide a well-fitting rubber stopper, suitably perforated. In the perforation in this stopper insert a vertical exit tube about 13 cm. in total length and 1 cm. in diameter throughout the upper portion (for about 10 cm.) and constricted at its lower extremity to a tube of about 3 cm. in length and about 5 mm. in diameter. This latter tube should extend but slightly below the stopper. In the lower part of the wider exit tube insert a small pledget of dry glass wool (see page 534) and then a strip of the freshly prepared but dry lead acetate test paper (see page 536) rolled into a coil, and above this a plug of the moist (not wet) lead acetate glass wool (see page 536). In the upper extremity of this tube insert through a perforated cork stopper, a glass tube 12 cm. in length, having an internal diameter of about 3 mm. Place the mercuric bromide test paper (see page 538) in this tube, bending or creasing the upper portion of the strip so that it will retain its position. The strip should extend within about 2 cm. of the perforated cork stopper and must not be introduced into the tube until ready to start the test. This tube should be thoroughly cleaned and dried each time it is used.

Standard Arsenic Test Solution.—Dissolve 0.1 Gm. of arsenic trioxide (see page 64), which has been finely pulverized, dried in a desiccator, and accurately weighed, in about 5 mils of a 20 per cent. solution of sodium hydroxide (free from arsenic). Neutralize the solution with diluted sulphuric acid (free from arsenic), add 10 mils of the same acid and sufficient recently boiled distilled water to bring the volume of the solution to exactly 1000 mils at 25° C. Accurately measure 10 mils of this solution, transfer it to a 1000 mil flask, add 10 mils of diluted sulphuric acid (free from arsenic) and make up the volume with recently boiled distilled water to exactly 1000 mils at 25° C. Employ this solution, containing 0.001 milligramme of arsenic trioxide in each 1 mil (at 25° C.), in preparing the standard stain. Keep this solution in a glass-stoppered bottle. It is advisable to make fresh solutions whenever new standard stains are to be prepared.

Preparation of the Chemical to be Tested.—Add 1 mil of a mixture of equal volumes of concentrated sulphuric acid (see page 552) and distilled water, to 5 mils of an aqueous solution of the chemical (1 in 25) or to a solution in 5 mils of distilled water of the residue remaining after any special treatment that may be directed. This acidulation is not necessary in the case of inorganic acids. Now, unless specially directed, add 10 mils of a saturated aqueous solution of sulphurous acid (see page 553). Evaporate this liquid in a small beaker, on a water bath, until it is free from sulphurous acid and has been reduced to about 2 mils in volume. Dilute this evaporated liquid to about 5 mils with distilled water.

The Test for Arsenic

Preparation of the Standard Stain.—Introduce into the generator from 8 to 10 Gm. of zinc (see page 553) followed by 25 mils of dilute sulphuric acid, prepared by mixing 1 part of concentrated sulphuric acid, free from arsenic (see page 552), with 4 parts of distilled water, and 5 drops of acid stannous chloride T.S. (see page 551). Add at once 2 mils (accurately measured at 25° C.) of the standard arsenic T.S. (see page 584), and immediately insert the stopper containing the exit tube, into which have been placed the glass wool pledget, the dry lead acetate test paper, the moist lead acetate glass wool, and the mercuric bromide test paper, as described under the *Test Apparatus* (see page 584). Should the evolution of the gas be violent at first, check the reaction by immersing the bottle in cold water. Should the reaction subside, increase it by placing the bottle in warm water. If the reaction be too violent, the stain will spread and not form a distinctive band, thus making the comparisons of color intensity difficult. After the test has continued for forty-five minutes, remove the mercuric bromide test paper and place it in a clean, dry tube for comparison. This stain represents 0.002 milligramme of arsenic trioxide in addition to any stain produced by the reagents. The stain from the reagents should scarcely be perceptible when determined by a blank experiment. Since light, heat and moisture cause the stain to fade rapidly, comparison should be made as soon as possible. The stained test papers may be preserved by either dipping in hot, melted paraffin or keeping them over phosphoric anhydride protected from light.

Testing the Chemical.—Introduce into another generator from 8 to 10 Gm. of the zinc, followed by 25 mils of the dilute sulphuric acid (1 to 4) and 5 drops of acid stannous chloride T.S. Insert the stopper containing the exit tube charged with the test papers and glass wool, as just described. Then add 5 mils of the solution to be tested, previously treated as directed, under *Preparation of the Chemical* (see page 584), and immediately insert the stopper charged with the test papers and glass wool. When the evolution of hydrogen has proceeded actively for forty-five minutes, remove the mercuric bromide test paper and carefully compare it with the standard stain prepared as described above. The stain produced by the chemicals tested does not exceed in length or intensity of color that prepared as the standard, indicating not more than 1 part of arsenic in 100,000 parts of the substance tested.

Interfering Chemicals.—*Antimony*, if present in the substance tested, will produce a gray stain. *Sulphites, sulphides, thiosulphates*, and other compounds which liberate hydrogen sulphide or sulphurous acid when treated with sulphuric acid, must be oxidized by means of nitric acid and then reduced by means of sulphurous acid as directed under *Preparation of the Chemical to be Tested* (see page 584), before introducing them into the apparatus. *Sulphur compounds* as well as *hydrogen phosphide* give a bright yellow band on the test paper. If sulphur compounds are present, a simultaneous darkening of the lead acetate test paper and glass wool will occur. If such is the case, the operation as directed under *Preparation of the Chemical to be Tested* (see page 584) must be repeated upon a fresh portion of the solution being tested, using greater care in effecting the complete removal of the sulphurous acid. In testing hypophosphites special care should be observed to completely oxidize the solution being tested as directed, otherwise a yellow stain may be produced through the evolution of hydrogen phosphide, which might be confused with the orange-yellow color produced by arsenic. *Compounds containing antimony* should be tested for *arsenic* by Bettendorf's Test (see Test No. 2).

The test apparatus should be thoroughly cleaned and dried immediately before and after use.

2. Arsenic Test, Bettendorf's

This test is employed only in testing salts of *bismuth* and compounds containing *antimony* for the presence of arsenic.

To a solution of the prescribed quantity of the substance to be tested in 5 mils of concentrated hydrochloric acid (see page 534) contained in a clean test tube, add 10 mils of saturated stannous chloride T.S. (see page 551) which has been freshly prepared, and set it aside for thirty minutes. If arsenic is present in non-permissible amounts, a brownish tint or precipitate will be seen when the tube is placed over a white surface and the solution viewed from above, comparison being made with a mixture of 5 mils of concentrated hydrochloric acid (see page 534) and 10 mils of concentrated stannous chloride T.S., prepared as directed above.

NOTE: It is absolutely necessary that for this test the solution of stannous chloride be freshly prepared, and that nitrates, sulphates, sulphites, sulphides and compounds of mercury, gold, and selenium be absent from the reagents, and the chemicals being tested.

3. Test for Heavy Metals

Chemicals.—This test is to be used to detect the presence of undesirable metallic impurities in official chemical substances or their solutions; these must not respond affirmatively within the stated time. Acidulate 10 mils of a solution of the substance in distilled water (1 in 50), contained in a test tube of about 40 mils capacity and of about 2.5 cm. diameter, with 1 mil of diluted hydrochloric acid (unless otherwise directed),* warm it to about 50° C., add an equal volume of freshly prepared hydrogen sulphide T.S., stopper, and allow the mixture to stand at 35° C. for half an hour. At the end of this time the mixture should still possess the odor of hydrogen sulphide; if not, it should be thoroughly saturated with the gas and again set aside for half an hour. The color produced, if any, is not greater than that observed by a blank test made in the same manner and with the same quantities of the reagents (omitting the solution to be tested); the solutions being viewed crosswise by reflected light while held against a white surface. A slight turbidity due to separation of sulphur from the hydrogen sulphide may occur.

Volatile Oils.—Shake 10 mils of the oil with an equal volume of distilled water to which a drop of hydrochloric acid has been added and pass hydrogen sulphide through the mixture until it is saturated; no darkening in color will be produced in either the oil or the water (*lead or copper*).

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*First neutralize solutions of acids carefully by the addition of ammonia water and then acidify as above directed.

4. Electrolytic Determinations

Mercury and Zinc.—The electrolytic apparatus consists principally of an ammeter, voltmeter, and rheostat, properly connected with the source of the current, a platinum spiral anode and a device for rotating the anode.

The source of the current may be either storage batteries or any other system which permits the regulation of the voltage and amperage.

Mercury is determined in a mercury cathode cup. It consists of a glass cylinder about 6.5 cm. high and 3.5 cm. in diameter, into which is fused a platinum wire near the bottom, and containing 50-60 Gm. of pure mercury. The platinum wire must be in contact with the mercury.

For the determination of zinc, a nickel dish of about 175 mils capacity is used. A platinum dish upon which a thin layer of silver or copper has been previously deposited may also be used.

Corrosive Mercuric Chloride.—Dissolve 0.3 to 0.4 Gm. of the salt, accurately weighed, in 10 mils of distilled water and transfer the solution to the cathode cup, which has previously been weighed with its metallic mercury. Dilute the liquid to about 20 mils with distilled water, add 1 mil of nitric acid diluted with an equal volume of water and 10 mils of toluol, and pass through the solution a current of 1 to 3 amperes and 8 to 12 volts, stirring the solution by rotating the anode 500 to 600 revolutions per minute. After twenty minutes, when the mercury is all removed from solution (to be ascertained by removing a few drops of the solution and testing with hydrogen sulphide) wash with distilled water, with the aid of a siphon and without interrupting the current until the current drops to nearly zero. Remove the cathode cup, wash the mercury with alcohol, then with ether, remove most of the remaining ether with filter paper, then dry in a desiccator over sulphuric acid and weigh. The increase in the weight in the cathode cup represents the amount of mercury present in the quantity of the salt taken.

Mercury (Metallic), Mercuric Oxide (Red or Yellow), Mercury with Chalk and Solution of Mercuric Nitrate.—Dissolve an accurately weighed quantity of the substance in nitric acid (1:1) (mercury, metallic, or mercuric oxide 0.2 to 0.3 Gm. in 1 mil; mercury with chalk 0.6 to 0.8 Gm. in 2.5 mils; solution of mercuric nitrate 0.5 to 0.7 Gm. with 0.5 mil of nitric acid added), transfer the solution to the cathode cup which has previously been weighed with its metallic mercury, and dilute with distilled water to about 30 mils. Electrolyze the solution as described under *Corrosive Mercuric Chloride,* using a current of 1.5 to 2 amperes and 7 to 10 volts.

Ammoniated Mercury, Calomel, Mercuric Salicylate, Red Mercuric Iodide, Yellow Mercurous Iodide.—Introduce the accurately weighed substance (0.5 to 0.6 Gm. ammoniated mercury or calomel; 0.7 to 0.8 Gm. mercuric salicylate or yellow mercurous iodide; 1.0 to 1.2 Gm. red mercuric iodide) into the cathode cup, previously weighed with its metallic mercury, add 10 mils of solution of sodium sulphide (made by dissolving 50 Gm. crystallized sodium sulphide in sufficient distilled water to measure 100 mils) and dissolve as far as possible by agitation. Dilute the mixture to about 30 mils with distilled water and pass through the solution a current of 2 to 3 amperes and 7 to 10 volts for thirty minutes (or until a few drops of the liquid do not give a black precipitate or coloration when gently warmed with a few drops of concentrated ammonium chloride solution), stirring the solution by rotating the anode about 500 revolutions per minute. Wash the mercury, as described under *Corrosive*

Mercuric Chloride, except that before washing with alcohol allow it to stand with about 20 mils of dilute acetic acid (from 2 to 3 per cent.) until bubbles cease to be evolved.

One gramme of Mercury is the equivalent of:	Gramme.
Ammoniated Mercury, $HgNH_2Cl$	1.2566
Mercuric Chloride, Corrosive, $HgCl_2$	1.3535
Mercurous Chloride, Mild, $HgCl$	1.1768
Mercuric Iodide, Red, HgI_2	2.2654
Mercuric Nitrate, $Hg(NO_3)_2$	1.618
Mercuric Oxide (Red or Yellow), HgO	1.0798
Mercurous Iodide, Yellow, HgI	1.6327

Zinc.—Introduce into the weighed dish, an accurately weighed quantity of the salt, equivalent to about 0.15 Gm. metallic zinc (zinc acetate, 0.5 Gm.; zinc carbonate, 0.25 Gm.; zinc chloride, 0.3 Gm.; zinc oxide, 0.2 Gm.; zinc phenolsulphonate, 1.2 Gm.; zinc sulphate, 0.6 Gm.; zinc valerate, 0.7 Gm.); dissolve it in distilled water or in 10 mils of diluted sulphuric acid (zinc carbonate, zinc oxide), add from 30 to 35 mils of sodium hydroxide solution (20 per cent.) and dilute with distilled water to about 120 mils. Heat the mixture nearly to boiling and electrolyze for thirty minutes with a current of 4 to 5 amperes and 5 to 6 volts, stirring the solution by rotating the anode 500 to 600 revolutions per minute. Without interrupting the current, wash the deposited zinc with distilled water with the aid of a siphon until the current drops to zero or nearly so. Remove the dish, wash the zinc first with alcohol then with ether, dry in a desiccator over sulphuric acid and weigh. The increase in the weight of the dish represents the amount of zinc present in the weight of the salt taken.

To determine zinc in zinc metal, weigh accurately about 1.5 Gm. of the metal, dissolve it by warming with 40 mils of diluted sulphuric acid, filter the solution, if necessary; wash the filter well with distilled water and make up the volume of the solution and washings to 100 mils. Measure 10 mils of this liquid into the weighed dish and proceed as directed above.

One gramme of Zinc is the equivalent of:	Gramme.
Zinc Acetate, $Zn(C_2H_3O_2)_2+2H_2O$	3.3570
Zinc Chloride, $ZnCl_2$	2.0849
Zinc Oxide, ZnO	1.2448
Zinc Phenolsulphonate, $Zn(C_6H_5SO_4)_2+8H_2O$	8.5011
Zinc Sulphate, $ZnSO_4+7H_2O$	4.3988
Zinc Valerate, $Zn(C_5H_9O_2)_2+2H_2O$	4.6436

5. Assay for Chlorides, Bromides and Iodides

Chlorides.—Dissolve about 0.2 Gm. of the salt to be assayed,* accurately weighed (corresponding to from 30 to 40 mils of tenth-normal silver nitrate V.S.), in 25 mils of distilled water in a 200 mil graduated flask. Add 50 mils of tenth-normal silver nitrate V.S. to the solution, and, after adding 5 mils of nitric acid, add sufficient distilled water to make 200 mils and mix the contents well. Then filter the mixture through a dry filter into a dry flask, and reject the first 20 mils of the filtrate. Add 2 mils of ferric ammonium sulphate T.S. to 100 mils of the subsequent filtrate and then titrate with tenth-normal potassium sulphocyanate V.S., until the supernatant liquid remains reddish after it is well shaken. Multiply the number of mils of tenth-normal potassium sulphocyanate V.S. required by 2 and subtract this figure from the number of mils of tenth-normal silver nitrate V.S. added. The difference, multiplied by the equivalent of the respective chloride (see page 572) represents the amount of chloride present in the weight of the salt or solution taken.

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* Take 0.4 Gm. of solution of zinc chloride if assayed by this method.

Bromides and Iodides.—Dissolve about 0.4 Gm. of the salt if a bromide, or 0.5 Gm. of the salt if an iodide,* accurately weighed, in 25 mils of distilled water in a glass-stoppered flask. Add 50 mils of tenth-normal silver nitrate V.S. to the solution, then, after adding 2 mils of ferric ammonium sulphate T.S. and 2 mils of nitric acid, determine the excess of silver nitrate by titrating with tenth-normal potassium sulphocyanate V.S. until the supernatant liquid remains reddish after it is well shaken.

The difference between the number of mils of tenth-normal silver nitrate V.S. added and the number of mils of tenth-normal potassium sulphocyanate V.S. used, multiplied by the equivalent of the respective bromide or iodide being assayed (see page 572) represents the amount of the bromide or iodide present in the weight of the salt taken. This difference, divided by the weight of the salt taken, represents the number of mils of tenth-normal silver nitrate V.S. required by 1 Gm. of the salt.

6. Assay for Alkali Salts of Organic Acids

Heat about 2 Gm. of the salt to be assayed, accurately weighed, in a platinum or porcelain crucible, at first very gently, then gradually raise the temperature until the salt is thoroughly carbonized. (Do not use platinum crucibles for lithium salts.) The final temperature must not exceed a dull red heat and the flame of the burner must not come in contact with the carbonized mass. After allowing the carbonized mass to cool, disintegrate it with the aid of a stout glass rod and transfer the mass and crucible to a beaker. Add 50 mils of distilled water and 50 mils of half-normal sulphuric acid V.S., cover the beaker with a watch glass and boil the contents for thirty minutes. Then filter the solution and wash the residue with hot distilled water until the washings cease to redden blue litmus paper. Now determine the residual acid in the cooled filtrate by titration with half-normal potassium hydroxide V.S., using methyl orange T.S. as indicator. The difference between the number of mils of half-normal sulphuric acid V.S. added and the number of mils of half-normal potassium hydroxide V.S. used, multiplied by the respective equivalent of the salt (see page 577) represents the amount of salt present in the amount taken.

7. Determination of Ash or Non-volatile Matter

Chemicals.—Weigh accurately from 1 to 2 Gm. of the chemical or the amount directed in the text, and place it in a tared platinum or porcelain crucible. Ignite it, at first very gently, and then gradually raise the temperature until the carbon, if formed, is completely burned off. Conduct the ignition in a place protected from air currents and use as low a temperature as possible to effect the combustion of the carbon. When the carbon has completely disappeared, transfer the crucible while still hot to a desiccator and weigh it when cold. In the case of substances which increase in volume on ignition, or where it is very difficult to burn off the carbon, the determination is facilitated by using a platinum dish of suitable size, or by igniting the weighed quantity of the substance, in the manner described above, in several separate portions.

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* Take 0.7 Gm. of strontium bromide or strontium iodide.

To test for non-volatile matter in volatile inorganic chemicals proceed as directed above, using as low a temperature as possible.

Vegetable Drugs.—Incinerate 2 Gm. of the ground drug until free from carbon and of constant weight, using a tared crucible and the lowest temperature possible, then determine the weight of the ash. If a carbon-free ash cannot be obtained in this way, exhaust the charred mass with distilled water, collect the insoluble residue on a filter paper of known ash content, incinerate the residue and filter paper until the ash is white or nearly so, then add the filtrate, evaporate it to dryness and heat the whole to a low redness. Finally determine the weight of the ash, deducting the weight of the ash from the filter.

8. Iodine Absorption Value

The iodine value or number of a fat or oil indicates the proportion of iodine absorbed under specified conditions. It is determined as follows: Introduce about 0.8 Gm. of a solid fat or about 0.3 Gm.* of an oil, accurately weighed, into a glass-stoppered bottle of 250 mils capacity, dissolve it in 10 mils of chloroform, add 25 mils of iodo-bromide T.S. (see page 536), accurately measured from a burette or pipette, stopper the bottle securely, and allow the mixture to stand for half an hour † in a cool place protected from light. After this time it must still retain a brown color; if the color is not brown a new test should be started, using a smaller quantity of the fat or oil. Then add in the order named 30 mils of potassium iodide T.S., 100 mils of distilled water, and tenth-normal sodium thiosulphate V.S. in small, successive portions, shaking thoroughly after each addition, until the color of the mixture becomes quite pale. Then add a few drops of starch T.S. and continue the addition of tenth-normal sodium thiosulphate V.S. until the blue color is discharged. While this test is being carried out, make a blank test by mixing exactly the same quantities of iodo-bromide T.S. and chloroform and titrating the free iodine with tenth-normal sodium thiosulphate V.S. as directed above. The difference in the number of mils of tenth-normal sodium thiosulphate V.S. consumed by the blank test and the actual test, multiplied by 1.269 and divided by the weight of the fat or oil taken, gives the iodine value.

9. Saponification Value

The saponification value of a fat or oil is the quantity of potassium hydroxide (expressed in milligrammes) consumed in saponifying 1 Gm. of the fat or oil. It is determined as follows: Weigh accurately, in a flask of 200 to 250 mils capacity, 1.5 to 2 Gm. of the filtered fat or oil and add to it 25 mils of alcoholic potassium hydroxide V.S. (see page 567), accurately measured from a burette or pipette. Insert into the neck of the flask, by means of a perforated stopper, a glass tube from 70 to

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* 0.15 to 0.18 Gm. for linseed oil, 0.18 to 0.2 Gm. for cod liver oil, and 0.8 to 1.0 Gm. for oil of theobroma.

† One hour is required for castor oil and linseed oil.

80 cm. in length and from 5 to 8 mm. in diameter and heat the flask on a water bath for half an hour, frequently imparting a rotatory motion to the contents. Then add 1 mil of phenolphthalein T.S. and titrate the excess of potassium hydroxide with half-normal hydrochloric acid V.S. Make a blank test at the same time, using exactly the same amount of alcoholic potassium hydroxide V.S. The difference in the number of mils of half-normal hydrochloric acid V.S. consumed in the actual test and the blank, multiplied by 28.055 and divided by the weight of the fat or oil taken, gives the saponification value.

10. Acid Number for Resins

The acid number of a resinous substance is the quantity of potassium hydroxide (expressed in milligrammes) required to neutralize 1 Gm. of the resinous substance. Dissolve in alcohol about 2 Gm. of the resinous substance to be tested, accurately weighed, add a few drops of phenolphthalein T.S. and titrate with half-normal potassium hydroxide V.S. The number of mils of half-normal potassium hydroxide V.S. required for neutralization, when multiplied by 0.028055 and the product divided by the weight taken, gives the acid number of the resin. The reaction is often more distinct if an excess of half-normal potassium hydroxide V.S. is used and the solution titrated back with half-normal acid V.S.

11. Determination of Crude Fiber

Exhaust a weighed quantity of the ground material, representing about 2 Gm. of the drug, with ether or use the residue from the determination of the volatile extract soluble in ether (see below). Add 200 mils of boiling sulphuric acid solution, adjusted to exactly 1.25 per cent. by titration, to the ether-exhausted drug, in a 500 mil flask and connect the flask with a reflux condenser, the tube of which passes only a short distance below the rubber stopper, into the flask. Heat the mixture to boiling and continue the boiling during thirty minutes. Then filter the mixture through asbestos or glass wool and wash the residue on the filter with boiling distilled water until the washings are no longer acid. Rinse the residue back into the flask with 200 mils of boiling sodium hydroxide solution, adjusted to exactly 1.25 per cent. by titration, and free from sodium carbonate. Again heat the mixture to boiling and continue the boiling during thirty minutes under the reflux condenser as described under the treatment with acid, then rapidly filter through a tared filter, wash the residue with boiling distilled water until the washings are neutral, dry it at 110° C. until of constant weight and note the weight. Now completely incinerate the dried residue and weigh the ash; the loss of weight is considered to be the crude fiber.

12. Determination of Volatile Extractive, Soluble in Ether

Extract completely 2 Gm. of the thoroughly dried and ground drug by subjecting it, during twenty hours, to the action of dehydrated ether (see page 531) in a continuous extraction apparatus. Transfer the ethereal solution to a tared porcelain dish and allow it to evaporate spontaneously. Then dry it in a desiccator over sulphuric acid during eighteen hours and weigh the total ether extract. Now heat the extract gradually up to 110° C. until the weight becomes constant; the loss in weight during the heating represents the volatile portion of the extract.

13. Determination of Non-volatile Extractive, Soluble in Ether

Proceed as directed under *Determination of Volatile Extractive, Soluble in Ether* (see No. 12). The weight of the extract after drying in a desiccator and then at 110° C. until of constant weight represents the non-volatile portion of the extract.

14. Determination of Alcohol in Official Preparations

Place 25 mils of the preparation, measured at any definite temperature between 15° and 30° C., in a distilling flask of about 200 mils capacity, provided with a high side tube connected with a suitable condenser; add 50 mils of distilled water, distil into a 50 mil graduated flask, at such a rate that about 48 mils of distillate will be received in a half hour; if volatile products other than alcohol are known to be absent, bring to the original temperature and dilute with water of the same temperature to 50 mils.

Determine the specific gravity of the distillate at any definite temperature between 15° and 30° C. by means of a pycnometer, and find the per cent. of absolute alcohol by volume by reference to the alcoholometric table (page 633), and multiply by the dilution factor to find the per cent. of alcohol in the original preparation.

If the preparation is suspected to contain less than 25 per cent. of alcohol, 50 mils should be taken for analysis; if it is suspected to contain over 50 per cent. of alcohol, 12.5 mils should be taken for analysis. In either case, the volume of the distillate should be made up as usual to 50 mils.

If the preparation contains iodine, combine it with zinc dust. (Sodium thiosulphate may be used instead of zinc dust, in which case several drops of sodium hydroxide T.S. should be added to prevent sulphur from distilling over.)

If volatile acids are present, neutralize with sodium hydroxide T.S.; if volatile bases are present, neutralize with dilute sulphuric acid; if both volatile acids and volatile bases are present, neutralize first with dilute sulphuric acid and distil about 50 mils, neutralize this distillate with sodium hydroxide T.S., and distil once more to obtain in the usual manner 50 mils.

If acetone, camphor, chloroform, ether, glycerin (30 per cent. or over), volatile oils or other volatile products are known or suspected to be present, transfer the first distillate to a separatory funnel and saturate it with sodium chloride, add 15 mils of petroleum benzin (boiling point 40°–50° C.) and shake the mixture for one or two minutes. After the liquids have *completely* separated, draw off the lower alcoholic salt solution, with a second separator, and repeat the extraction with 15 mils of petroleum benzin; draw off the lower alcoholic salt solution into a distilling flask of about 200 mils capacity, wash the combined petroleum benzin solutions with about 25 mils of saturated sodium chloride solution and add the washings to the distilling flask. Distil into a 50 mil graduated flask at such a rate that about 45 to 48 mils of distillate are received within a half hour. Bring to the original temperature, dilute with water of the same temperature to 50 mils, and determine the specific gravity and alcoholic per cent. as directed above.

Alcoholic Content in Preparations

The figures given in the following table represent the average alcoholic content. It is impracticable to require an exact standard in alcoholic liquids made from drugs which contain varying proportions of moisture and extractive, and there is unavoidable loss of alcohol through evaporation during the manufacture and storage of preparations. In addition to this, allowance must be made in distillation for some loss incidental to the process, hence a tolerance of ten per cent. more or ten per cent. less than the figures given in the following table is permitted.

Per Cent. by Volume of Absolute Alcohol

Acidum Sulphuricum Aromaticum	85
Elixir Aromaticum	22
Elixir Glycyrrhizæ	22
Linimentum Belladonnæ	65
Linimentum Chloroformi	47
Linimentum Saponis	66
Mistura Glycyrrhizæ Composita	8
Spiritus Ætheris	66
Spiritus Ætheris Nitrosi	92
Spiritus Ammoniæ Aromaticus	68
Spiritus Amygdalæ Amaræ	76
Spiritus Anisi	85
Spiritus Aurantii Compositus	69
Spiritus Camphoræ	90
Spiritus Chloroformi	89
Spiritus Cinnamomi	85
Spiritus Glycerylis Nitratis	94
Spiritus Juniperi	90
Spiritus Juniperi Compositus	66
Spiritus Lavandulæ	90
Spiritus Menthæ Piperitæ	85
Spiritus Menthæ Viridis	85
Tinctura Aconiti	66
Tinctura Aloes	47
Tinctura Arnicæ	46
Tinctura Asafœtidæ	81
Tinctura Aurantii Amari	55
Tinctura Aurantii Dulcis	83
Tinctura Belladonnæ Foliorum	47
Tinctura Benzoini	83
Tinctura Benzoini Composita	80
Tinctura Calumbæ	55
Tinctura Cannabis	90
Tinctura Cantharidis	90
Tinctura Capsici	88
Tinctura Cardamomi	46
Tinctura Cardamomi Composita	46
Tinctura Cinchonæ	63
Tinctura Cinchonæ Composita	64
Tinctura Cinnamomi	63
Tinctura Colchici Seminis	56
Tinctura Digitalis	70
Tinctura Ferri Chloridi	63
Tinctura Gambir Composita	47
Tinctura Gelsemii	62
Tinctura Gentianæ Composita	46
Tinctura Guaiaci	80
Tinctura Guaiaci Ammoniata	60
Tinctura Hydrastis	61
Tinctura Hyoscyami	47
Tinctura Iodi	83
Tinctura Kino	47
Tinctura Lactucarii	46
Tinctura Lavandulæ Composita	70
Tinctura Limonis Corticis	83
Tinctura Lobeliæ	46
Tinctura Moschi	48
Tinctura Myrrhæ	87
Tinctura Nucis Vomicæ	71
Tinctura Opii	46
Tinctura Opii Camphorata	46
Tinctura Opii Deodorati	19
Tinctura Physostigmatis	92
Tinctura Pyrethri	90
Tinctura Quassiæ	31
Tinctura Rhei	46
Tinctura Rhei Aromatica	46
Tinctura Sanguinariæ	56
Tinctura Scillæ	69
Tinctura Stramonii	45
Tinctura Strophanthi	92
Tinctura Tolutana	85
Tinctura Valerianæ	69
Tinctura Valerianæ Ammoniata	64
Tinctura Veratri Viridis	91
Tinctura Zingiberis	90

15. Proximate Assays

General Directions for Alkaloidal Assays

Nearly all alkaloids are practically insoluble in water, but they are more or less soluble in alcohol, chloroform, ether, amyl alcohol, benzene, petroleum benzin, or mixtures of several of these. The salts of the alkaloids, however, are mostly soluble in water, but practically insoluble in nearly all of the above mentioned solvents. The process of assay by immiscible solvents, which is generally known as the "shaking out" process, is based on this property of alkaloids, and it is carried out by treating the drug or a concentrated liquid extract with a solvent immiscible with water, in the presence of an excess of alkali, which liberates the alkaloid. The free alkaloid is dissolved by the immiscible solvent, which is then transferred to a separator and shaken with an excess of acid diluted with water.

When a drug to be assayed is directed to be made from a powder of a certain degree of fineness it is understood to mean that it must not be coarser than the size directed; a finer powder may, however, be used.

If the immiscible solvent is specifically heavier than water (*e.g.*, chloroform or a mixture of more than one volume of chloroform to one volume of ether) it will separate in the bottom of the separator. It is then drawn off into another separator and shaken with successive portions of weak acid until the alkaloid is all removed.

If the immiscible solvent is specifically lighter than water (*e.g.*, ether, or a mixture of more than two volumes of ether with one volume of chloroform) it will, on separation, form the upper liquid. The lower acid liquid is then drawn off and preserved, and the residual immiscible solvent shaken with successive portions of weak acid until wholly free from alkaloid.

The volume and strength of the acid to be used is left to the discretion of the operator. It is best, however, to keep the total volume as small as possible. For the first extraction, it is advisable to use 10 mils of half-normal acid V.S. or sufficient to render the mixture distinctly acid; for the second extraction, use 5 mils of half-normal acid V.S. and 5 mils of distilled water. Repeat the extraction with the same proportion of acid and distilled water. In all assays, the extraction should be continued until 0.5 mil of the acid washings shows only a very faint cloudiness on the addition of a drop of mercuric-potassium iodide T.S., or, in the case of caffeine and colchicine, on the addition of a drop of iodine T.S.

The united acid solutions containing the alkaloid in the form of a salt are shaken thoroughly with ether and allowed to stand at least fifteen minutes for complete separation. The acid solution is then drawn off into a second separator, the ether washed with a little water and this wash water added to the acid solution. The acid solution is then made alkaline, in most cases with ammonia water, and shaken out with several successive portions of the appropriate immiscible solvent. The volume of the latter to be used in each operation is not less than half that of the acid solution, and the operation must be repeated as long as any alkaloid is extracted by the immiscible solvent. To test this, evaporate 1 mil of the last extraction and dissolve the residue in a few drops of diluted hydrochloric acid; the resulting solution should show not more than a very faint cloudiness on the addition of a drop of mercuric-potassium iodide T.S., or, in the case of caffeine and colchicine, on the addition of a drop of iodine T.S. The number of extractions required depends largely on the character of the alkaloid. With most alkaloids it is advisable to "shake out" three or four times before testing. Physostigmine and pilocarpine require about twice as many extractions as most other alkaloids.

After having drawn off from a separator any liquid containing an alkaloid, a fresh portion of the solvent should be immediately added to the contents of the separator, and, before shaking, about 1 mil of this should be drawn off to wash out the stem of the separator. In the case of volatile solvents, the outside of the stem of the separator should also be washed by dipping it in the portion of the fresh solvent to be used for the next shaking out operation. Before evaporation the final ether or chloroform solution should be filtered through a dry filter, or preferably through a pledget of purified cotton. When filtering volatile solvents containing alkaloids through a paper filter, the upper edge of the filter should not reach the top of the funnel and the filter should be kept constantly full of the liquid until all has been added, then covered until the last of the liquid has passed through. Finally the filter should be washed thoroughly by applying portions of the volatile solvent to the top and carefully washing the outside of the funnel stem. Immiscible solvents heavier than water may be conveniently filtered by packing the stem of the separator below the stopcock with purified cotton before drawing off the solvent. The alkaloidal solution is finally evaporated cautiously to expel the solvent, and the residue either dried to constant weight and weighed, or more commonly titrated with volumetric acid.

When using aliquot parts, the solvent and the aliquot part should be measured at the same temperature. When pouring volatile liquids, the lower the temperature at which the operation can be conducted, the less the danger of loss from evaporation.

The shaking or rotation with an immiscible solvent should ordinarily be continued about one minute. Long or violent agitation should be avoided as emulsions are apt to form. Should a partial emulsion form it may be broken up by drawing off the clear portion, introducing a tuft of cotton and with a glass rod moving the cotton about in the emulsion next to the surface of the separator. Should the emulsion prove persistent, draw off the emulsified portion and evaporate the volatile solvent. The resulting residue, if alkaline, should be washed with each successive portion of the solvent used in extracting the original solution. If acid it should be washed with acidulated water.

Emulsions are less apt to form in strongly acid or alkaline solutions than in those which are neutral or slightly acid or alkaline. Emulsification is sometimes prevented by increasing the volume of the aqueous or of the immiscible solvent. Chloroform or ether solutions of drugs rich in fat form very troublesome emulsions. In such cases it is advisable to add about 10 mils of normal sulphuric acid V.S., and evaporate the volatile solvent, stirring with a rubber-tipped glass rod. When the resinous and fatty matter has been agglutinated, cool the acid solution and filter it through a small wetted filter into a separator. Redissolve the residue in 15 mils of ether, add 5 mils of tenth-normal acid V.S., evaporate the ether as before, with continued stirring, and pour the acid solution through the filter into the separator. Repeat the extraction of the fatty residue with dilute acid two or three times and finally wash the filter free from alkaloids. Then make the solution in the separator alkaline, and "shake out" with the immiscible solvent in the usual manner.

The stems of separators and funnels and the lips of flasks, separators and graduates, from which volatile solvents containing alkaloids have been poured or drawn off, should be carefully washed to prevent loss and to remove any of the alkaloids left by evaporation, and the washings should be added to the solvent.

An alkaloidal residue to be determined volumetrically should be softened by the addition of about 1 mil of neutral alcohol or ether, the required amount of standard acid added, and the mixture gently warmed to insure the complete solution of the alkaloid. Finally add a sufficient quantity of distilled water to make the volume of the liquid for titration measure about 25 mils. When the residue is to be weighed, if the final solvent has been chloroform, the last traces of that solvent should be removed by the addition of a little ether or alcohol followed by evaporation; care being taken to avoid loss by decrepitation, especially when evaporating a chloroformic solution of nux vomica or of cinchona alkaloids. This may usually be prevented by the addition of a little alcohol after the solution has been reduced to a volume of one or two mils.

If preferred, methyl red T.S. may be used in place of cochineal T.S. for alkaloidal titration, in which case the volumetric solution should have been standardized by the use of methyl red T.S. If this has not been done a blank titration should be made to determine the factor for the tenth-normal sulphuric acid V.S., using methyl red T.S. as the indicator.

16. Melting Points

For the purpose of the Pharmacopœia the melting point is defined as that interval of temperature within which the substance is observed to melt when treated as directed below.

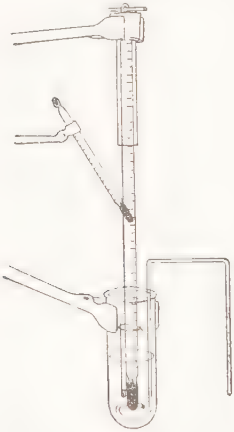
For the determination of the melting point, Pharmacopœial substances are divided into two classes:

Class I.—Substances readily reduced to a powder.

Class II.—Substances not readily reduced to a powder, such as fats, fat acids, paraffin, petrolatum and waxes.

Apparatus required (see illustration):

1. *A round-bottom, glass tube* of 30 mm. internal diameter and about 10 cm. long, flaring slightly at the top like an ordinary test tube. The walls of the tube are not more than 1.5 mm. thick at any point. The tube is made of glass which will stand heating over an open Bunsen flame.



Apparatus for taking melting points.

2. *A stirring device,* which can be made from a glass rod of about 2 mm. external diameter. It is made circular at the end to fit the container (1) and is bent twice at right angles above the top of the container to bring its outer end conveniently to hand for manipulation.

3. *A standard thermometer* covering the desired range of temperature (see page 610).

4. *An auxiliary thermometer* (see page 611).

5. *A capillary glass tube* about 6 cm. long and from 0.8 to 1.2 mm. internal diameter, the walls from 0.2 to 0.3 mm. thick and the tube closed at one end.

Procedure for Class I:

Reduce the substance to a No. 100 powder and, unless otherwise stated, render it anhydrous, when it contains water of crystallization, by drying it at the temperature given in the text, or, when the substance contains no water of crystallization, by drying it for twenty-four hours over sulphuric acid.

Select a bath suitable for the melting temperature to be determined, and fill the container to a depth which will permit of such immersion of the thermometer that the upper end of the bulb will be from 2 to 3 cm. below the surface of the bath and the lower end of the bulb about equally distant from the bottom of the container.

Charge a capillary glass tube with sufficient of the dry powder to form a column in the bottom of the tube from 2.5 to 3.5 mm. high when packed down as closely as possible by moderate tapping on a solid surface. Attach the capillary tube to the thermometer by wetting both with the liquid of the bath or by means of a piece of platinum wire and adjust it so that the substance is centrally located by the side of the thermometer bulb. Heat the bath by means of a free Bunsen flame until a temperature 25° C. below the supposed melting point is reached, then carefully regulate the rate of rise in temperature to about 3° per minute until the substance begins to melt (the temperature at which the column of the substance is observed to definitely collapse against the sides of the tube at any point is defined as the beginning of melting), and from that time carefully regulate the rise in temperature to about 0.5° per minute until melting is complete (the temperature at which the substance becomes liquid throughout is defined as the end of melting). The bath must be stirred constantly throughout the heating.

The result thus obtained as the melting interval must be adjusted by applying the calibration correction and that for the emergent stem, as follows:

Attach the auxiliary thermometer, as shown in the illustration, so that the center of its bulb is as close as possible to the stem of the main thermometer at a point midway between the surface of the bath and the supposed melting point. In order to prevent the heat from the burner or currents of cold air from affecting the temperature of the auxiliary thermometer, it is advisable to adjust to the stem of the main thermometer a movable platform made of stiff paper, having its edges folded so as to form a box-like shield surrounding the bulb of the auxiliary thermometer. Note the temperature registered by the auxiliary thermometer at the end of the melting of the substance and calculate the emergent stem correction by the following formula:

$$\text{correction} = 0.00015 \times N\ (T - t)$$

in which N represents the number of degrees of emergent stem from the bath, T the temperature at the end of melting, and t the temperature registered by the auxiliary thermometer; the correction to be added to the observed reading of the main thermometer.

To avoid the necessity of determining the emergent stem correction each time a melting point is taken, the corrections for intervals of 10° C. may be determined (at about 25° C. room temperature) and the results plotted on cross-section paper, the temperature of the bath represented by the abscissæ and the amount of correction by the ordinates. The correction for any intermediate temperature can then be interpolated.

NOTE: Suggestions regarding liquids to be used for baths in Class I:

For temperatures up to 200° C. a purified, concentrated sulphuric acid is a suitable bath. For higher temperatures, up to about 350° C., a pure grade of cotton seed oil (almost colorless) will serve for a limited number of determinations. Other, though less desirable, substitutes for sulphuric acid at high temperatures are: (1) a pure grade of paraffin which has been freshly distilled; (2) clean, white, artificial (cotton seed) lard. A very desirable bath for high temperature work is prepared by cautiously boiling together, for five to ten minutes under a hood, a mixture of 70 parts of purified concentrated sulphuric acid and 30 parts of potassium sulphate, stirring constantly until the sulphate is completely dissolved.

Procedure for Class II:

Carefully melt the substance to be tested at as low a temperature as possible and draw it into a capillary tube which is open at both ends, to a depth of about 10 mm. Cool the charged tube at 10° C., or lower, for twenty-four hours, or in contact with ice for at least two hours. Then attach the tube to a standard thermometer by means of a rubber band, adjust and heat it in a water bath, as directed in Class I, except that, within 5° of the assumed melting temperature, the rate of rise of temperature is carefully regulated to about 0.5° per minute.

The temperature at which the substance is observed to rise in the capillary tube is taken as the melting point.

17. Boiling Points

The boiling point is defined as that range of temperature within which at least 95 per cent., by volume, of the substance distils, when treated as directed below.

Apparatus Required.—*A distilling bulb* of from 50 to 60 mils capacity to the lower part of the neck, the length of the neck from 10 to 12 cm. and the internal diameter from 14 to 16 mm. The outlet tube of from 4 to 5 mm. internal diameter should be attached to the neck at approximately its midpoint, forming an angle of from 70° to 75° with the lower end of the neck.

A straight glass condenser with a water jacket from 40 to 60 cm. in length; the distance from the upper end of the water jacket to the neck of the bulb being from 18 to 25 cm.

Thermometer.—In order to avoid the necessity of an emergent stem correction, it is advisable that an accurately standardized thermometer of the Anschutz type be used. If such a thermometer is not available, a thermometer used for melting points (see page 596) may be employed, applying the emergent stem correction as described under *Melting Points* (see page 597), the length of emergent stem being measured, in degrees, from the lower end of the stopper to the highest point of the boiling temperature. When placed in position the lower end of the thermometer is 2 to 3.5 cm. below the center of the orifice of the outlet tube.

An asbestos board, of from 12 to 15 cm. square and from 3 to 5 mm. in thickness, having a circular perforation, located centrally, for the reception of the bulb. The edge of the asbestos around the perforation should fit closely to the bulb when the latter is set into it. The size of the perforation should be such that, when the bulb is set into it, the portion of the bulb below the upper surface of the asbestos will have a capacity of from 3 to 4 mils.

Procedure.—Place the asbestos board on a tripod or other suitable support. Introduce into the distilling bulb 25 mils of the liquid to be tested, insert the thermometer, stand the bulb in an upright position in the perforation of the asbestos board and connect it with the condenser. Then distil the liquid at the rate of 1 mil for each fifteen to twenty seconds, noting the temperature as soon as 5 drops of the liquid have distilled into the receiver and when 95 per cent. of the original volume has distilled. Correct the reading for any difference in the barometric pressure by allowing 0.1° C. for each 2.7 mm. difference from the standard pressure of 760 mm., adding if the pressure is lower, and subtracting if higher.

Note: In order to have the entire distillate distil over at the prescribed rate, it is best to make a preliminary distillation of a separate portion of 25 mils of the liquid, during which the source of heat (a good Bunsen burner) is regulated so that the distillation proceeds at the prescribed rate. Having thus regulated the burner, temporarily remove it, clean the bulb, recharge it with a fresh portion of 25 mils of the liquid and proceed with the distillation as described above.

18. Congealing Points

Unless otherwise directed, about 10 mils of the liquid to be tested is introduced into a dry test tube of from 18 to 20 mm. internal diameter, which is then cooled in water or a suitable freezing mixture, the temperature of which should be about 5° lower than the supposed congealing point of the liquid. To induce crystallization, rub the walls of the tube with a standard thermometer (see page 610), or add a small crystal of the substance being tested. By alternated immersion of the tube in the bath, or removal from the bath and constant stirring with the thermometer, the temperature is so adjusted that the greater part of the liquid gradually congeals. The highest temperature remaining constant for a short time during the congealing is defined as the congealing point.

19. Solubilities

The statements concerning solubilities quoted in this Pharmacopœia are not intended as physical constants in the strict sense of this term, but primarily as information required by physicians and pharmacists in connection with the preparation and dispensing of medicines.

The following points must be observed in the accurate determination of solubilities: 1. Purity of both the dissolved substance and solvent is essential since impurities in either affect the solubility to a greater or less extent. 2. The constancy of the temperature must be accurately maintained during the course of the determination. 3. Complete saturation must be secured. 4. Accurate analysis of the saturated solution and correct expression of the results are imperative. In connection with the above named essential features of a correct solubility determination, attention should be called to the varying rates of solution of different compounds, and to the marked effect of the degree of fineness of the particles upon the time required for the saturation of the solution. In general, it may be said that an equipment comprising a thermo-regulator and a constant agitation device is indispensable for accurate solubility determinations. The solubility of Pharmacopœial compounds in given solvents is considered to be of minor importance as a means for their identification or quantitative estimation, as the other tests contained in the description of each article in the text cover both identity and purity.

The solubility data given throughout this volume have for the most part been determined under the above described conditions, and will, therefore, frequently show a somewhat greater solubility than would be found in the daily experience of most pharmacists.

Method for Determining Solubilities.—In brief, this consists in preparing a saturated solution of the given substance and ascertaining, by analysis, the amount present in a definite quantity of the solution. Complete saturation can be attained most readily by constant stirring or agitation by means of a suitable mechanical contrivance. A simple apparatus for this purpose consists of a test tube of medium size fastened upright in a water bath maintained at constant temperature. The solvent and excess of solids are placed in the tube and stirred by means of a motor-driven rotating glass spiral. After a given period of stirring a definite weight of the clear solution is analyzed and the stirring continued for an additional period of several hours. If analysis shows no increase of dissolved substance after the second period of stirring, the result is to be taken as the solubility at the particular temperature. Minute details of methods for determining solubilities are described in Bulletin No. 67 of the Hygienic Laboratory, U. S. Public Health Service.

20. Gasometric Estimations

In certain cases the Pharmacopœia directs the strength of a product or chemical substance to be determined by the volume of gas (nitrogen dioxide) given off during a definite reaction. This volume is to be determined by the use of the nitrometer in the following manner:

Arrange a nitrometer consisting of a measuring tube (graduated into one-tenth milliliter divisions and having a capacity of at least 50 mils) connected by stout rubber tubing with an open equilibrium tube (both tubes, preferably, provided with a globular expansion near the lower end) in such a manner, by suitable clamps attached to a stand, that either tube may be readily and quickly clamped at a higher or lower level. The stop-cock of the measuring tube having been opened, and the open equilibrium tube having been raised to a higher level, pour into the latter a saturated aqueous solution of sodium chloride, until the measuring tube, including the bore of the stop-cock, is completely filled. Then close the latter and adjust the equilibrium tube at a low level. Having ascertained that the stop-cock is closed and is air tight, and having, if necessary, wiped out the graduated tube of the nitrometer, introduce into it the prescribed quantity of the liquid to be tested, and allow this to flow slowly into the measuring tube, being careful not to admit any air. Follow it by the prescribed quantities of the several reagents (potassium iodide T.S. and normal sulphuric acid V.S.). When the reaction (which takes place at once) moderates, remove the measuring tube from its clamp, and, being careful to hold it constantly so that the liquid contained in it stands at a higher level than that in the equilibrium tube, shake its contents, without permitting any gas to pass into the open tube. When the reaction has completely ceased and the volume of gas has become constant, which usually requires from thirty to sixty minutes, restore the tube to its fastening, and allow the apparatus and contents to acquire the ordinary temperature of the room, which is assumed to be at or about 25° C. Then adjust the two tubes so that the liquid columns are at exactly the same level, and read off the volume of gas in the measuring tube. Multiply this figure by the weight of the liquid being assayed which is the equivalent of 1 mil of nitrogen dioxide (see page 601). The result will be the weight of the absolute substance (ethyl, amyl, or sodium nitrite) contained in the quantity taken for the assay.

For pharmacopœial purposes the determination will be sufficiently exact if the evolved gas be measured within 3 degrees above or below 25° C.

Since temperature and barometric pressure affect the volume of the gas, the following correction factors must be used to obtain exact results when the temperature and pressure are not nearly normal. The barometer correction is important at any locality more than 250 meters above sea-level:

FACTORS FOR TEMPERATURE CORRECTIONS

(Normal Temperature, 25° C.)

Temperature	Factor	Temperature	Factor	Temperature	Factor
15° C.	1.035	22° C.	1.010	29° C.	0.987
16° C.	1.031	23° C.	1.007	30° C.	0.983
17° C.	1.028	24° C.	1.003	31° C.	0.980
18° C.	1.024	25° C.	1.000	32° C.	0.977
19° C.	1.021	26° C.	0.997	33° C.	0.974
20° C.	1.017	27° C.	0.993	34° C.	0.971
21° C.	1.014	28° C.	0.990	35° C.	0.968

Example: Assuming that the volume of gas read off was 44.5 mils at 32° C., and it is desired to ascertain the corresponding volume at 25° C., barometric pressure not being taken into consideration, then the 44.5 mils must be reduced in the proportion of 1 to 0.977 (see temperature correction factors above), or 44.5 must be multiplied by 0.977. The result will be 43.48 (more exactly 43.4765) mils as the equivalent volume of gas at 25° C.

FACTORS FOR CORRECTION FOR BAROMETRIC PRESSURE

(Normal Barometer, 760 mm.)

Barometer Reading		Factor	Barometer Reading		Factor
Millimeters	Inches		Millimeters	Inches	
790	31.10	1.039	660	25.98	0.868
780	30.71	1.026	650	25.59	0.855
770	30.31	1.013	640	25.20	0.842
760	29.92	1.000	630	24.80	0.829
750	29.53	0.987	620	24.41	0.816
740	29.13	0.974	610	24.02	0.803
730	28.74	0.961	600	23.62	0.789
720	28.35	0.947	590	23.23	0.776
710	27.95	0.934	580	22.83	0.763
700	27.56	0.921	570	22.44	0.750
690	27.17	0.908	560	22.05	0.737
680	26.77	0.895	550	21.65	0.724
670	26.38	0.882	540	21.26	0.711

Example: Assuming that the volume of gas read off was 43.48 mils at 590 mm. barometric pressure, and it is desired to ascertain the corresponding volume at normal barometric pressure (760 mm.), temperature not being taken into consideration, then the 43.48 mils must be reduced in the proportion of 1 to 0.776 (see barometric correction factors above), or 43.48 must be multiplied by 0.776. The result will be 33.74 mils as the equivalent volume of gas at normal barometric pressure.

ESTIMATION OF NITROGEN DIOXIDE

$$\mathrm{NO} = 30.01;\ 1\ \text{Liter} \begin{cases} \text{at } 0° \text{ C. and 760 mm.} = 1.3406 \text{ Gm.} \\ \text{at } 25° \text{ C. and 760 mm.} = 1.2281 \text{ Gm.} \end{cases}$$

One Milliliter of Nitrogen Dioxide is the equivalent of:

		At 0° C. and 760 mm. Gramme.	At 25° C. and 760 mm. Gramme.
Nitrogen Dioxide, NO	= 30.01	0.0013406	0.0012281
Amyl Nitrite, $C_5H_{11}NO_2$	= 117.10	0.0052310	0.0047920
Ethyl Nitrite, $C_2H_5NO_2$	= 75.05	0.0033528	0.00307127
Sodium Nitrite, $NaNO_2$	= 69.01	0.0030828	0.0028241

21. Optical Rotation

In a ray of ordinary light the transverse vibrations take place indifferently in any plane about the line of propagation. When these waves are limited to a single plane they are termed polarized and the phenomenon is known as polarization.

Many organic substances either liquid or in solution in suitable solvents, when examined in a specially constructed optical apparatus called a polariscope, are capable of rotating the plane of polarization of a ray of light either to the right or to the left. Such substances are termed "optically active," and when rotating to the right are designated as "dextrorotatory" and when rotating to the left as "lævorotatory." Substances which do not possess this property of optical rotation are termed "optically inactive." Optical activity in many instances is intimately connected with the chemical constitution of a substance and it frequently becomes a specific property and its determination is of considerable value.

Among the substances recognized by this Pharmacopœia, there are several, particularly certain essential or volatile oils and related bodies, for which the determination of the angle of rotation of a ray of polarized light, or, in some cases, the proof of their optical inactivity, affords the most simple and positive evidence of their identity or purity.

The instruments used for this purpose vary somewhat in their construction and are classified as polarimeters measuring angular rotation and saccharimeters measuring percentage of sugar. Those which are most generally adapted for the examination of the substances mentioned above are the penumbral or so-called "half-shadow" instruments of Laurent and of Schmidt and Hänsch in which the two sides of the field of vision are capable of becoming unequally illuminated. Polarimeters permit the angle of rotation to be read off in degrees or fractions of a degree of a circle. Saccharimeters, set to measure percentage of sucrose, give readings in terms of divisions of the sugar scale.

These determinations are best made in a dark room, and by means of monochromatic light, the latter being obtained by introducing into a non-luminous flame, on a loop of platinum wire, a small bead of fused sodium chloride. The light thus radiated corresponds with the line D of the solar spectrum.

The following factors are employed for converting readings of a saccharimeter into readings of a polarimeter.

1 division Laurent sugar scale equals 0.2167° angular rotation D.

1 division Schmidt and Hänsch sugar scale equals 0.346° angular rotation D.

Since the deviation of the plane of polarization either to the right or to the left of the zero point is directly proportional to the length of the column of liquid, it is important that the observations should be made with tubes of a definite length, such as 200, 100, 50, or 25 mm. The selection of the length of the tube to be employed is, however, usually dependent upon the depth of color of the liquid and the magnitude of its optical rotation.

The rotatory power of an optically active, liquid substance, observed with sodium light, and referred to the ideal density 1, and in a tube having a length of 1 decimeter (100 mm.), is designated as its *specific rotatory power*. This is usually expressed by the term $[\alpha]_D$. Since, however, not only the density of an optically active liquid, but also its rotation, is influenced by the temperature, the specific rotation varies with the latter. In stating the specific rotation it is, therefore, necessary to indicate at what temperature the rotation and the density of the liquid have been determined. But for the same temperature the specific rotation of a pure, optically active liquid is always a constant number. The temperature used in the text of this Pharmacopœia is 25° C., except when otherwise indicated. For saccharimeters the temperature is fixed at 20° C. by international agreement.

For calculating the specific rotatory power of an optically active liquid substance, or solution of an optically active solid, the following formulas are of general application:

I. For liquid substances $[\alpha]_D = \frac{100 \times \alpha}{L \times d}$

II. For solutions of solids $\left\{ \begin{array}{l} [\alpha]_D = \frac{10000 \times \alpha}{L \times p \times d} \\ \text{or} \quad [\alpha]_D = \frac{10000 \times \alpha}{L \times c} \end{array} \right.$

For calculating these formulas the determination of the following factors is necessary:

α = the angle of rotation of the liquid or solid observed with sodium light.
L = the length of the tube in millimeters.
d = the density of the active liquid or solution.
p = the amount of active substance in 100 parts by weight of the solution.
c = the number of grammes of active substance in 100 mils of solution.

22. Refractive Index

When a ray of light passes from one transparent substance to another, it is deflected, except when it enters perpendicularly to the surface of contact. The direction of the deviation is dependent upon the difference of density of the two substances; the extent is also influenced by this difference.

This deviation is termed refraction. When the ray passes from a substance of given density to one of greater density (*i.e.*, from air into glass) the refraction is towards the perpendicular meeting the surface at the point of contact; when passing from a substance of greater density to one of less (*i.e.*, from water into air) the ray deviates from the perpendicular at the point of contact.

Quantitative measurements of refraction are expressed as "indices of refraction," the index being the figure obtained by dividing the sine of the angle that the incident ray makes with the perpendicular, by the sine of the angle that the refracted ray makes with the same perpendicular; that is, it is the ratio between these sines. Thus, the ratio for a ray of light passing from air into water at standard temperature is about 4:3 or, expressing it decimally and with greater exactness, 1.336. This is, therefore, the index of refraction of water. The determination of the refractive index is accomplished by means of optical instruments known generally as *refractometers*, which are of several types. Some of these give figures on an arbitrary scale, the actual refractive index being ascertained by consulting a table.

As the exact temperature at which the examination is made is of great importance, all of the instruments are provided with attachments for circulating water of the proper temperature about the prisms or about the vessel containing the liquid to be observed, and are also equipped with thermometers for observing the temperature very closely.

The principal instruments in use are as follows:

Pulfrich Refractometer.—This instrument is used chiefly for purely scientific investigations. It is adapted for use with liquids and solids of all degrees of refractive power. When a liquid is to be examined it is placed in a small cylindrical glass vessel immediately above the observation prism. When solids are to be examined the glass cylinder is removed and the solid (previously polished) is placed in direct contact with the observation prism. The reading of this instrument is made by noting a boundary line between a light and a dark field in its position with reference to a graduated scale upon which the refractive index is directly expressed.

The Abbe Refractometer.—This is an instrument of wide utility, designed primarily for the examination of liquids. Only a few drops of the liquid are required for an observation. This is spread in a thin film between the two observation prisms. The index of refraction is also read off directly upon the scale of this instrument, in which, as in the Pulfrich Refractometer, a boundary line between a light and a dark field is the observation line.

The Zeiss Butyro-Refractometer.—This instrument is especially designed for the examination of fixed oils and fats. It is not applicable to aqueous or alcoholic liquids. The distinctive line for observation in this instrument is the border line of total reflection which is a narrow line capable usually of being accurately read to within a tenth of a unit of the arbitrary scale used. Sometimes this observation line is accompanied by a blue or a red fringe or haze which interferes with the accuracy of the reading. Should a close reading be impossible on this account it will be found necessary to use the monochromatic sodium flame for the observation (see under optical rotation).

Zeiss Immersion Refractometer.—This is adapted for the examination of aqueous, oily, or alcoholic liquids. The distinctive line for observation is as described under the preceding instrument, the border line of total reflection, which in this case is much sharper and capable of being much more accurately read. For making observations of the entire range of Pharmacopœial substances the Abbe instrument is the one generally selected, the Pulfrich instrument not being in common use and the Zeiss Butyro- and Immersion Refractometers not covering the entire range necessary.

23. Biological Assays

Inasmuch as there are several drugs more or less extensively used in the treatment of disease, for which no satisfactory chemical method of assay has been developed, other assays have been introduced in which these drugs are administered to animals and the effects noted. From the results obtained from these assays the strength of the preparation is calculated, and if necessary proper corrections are made so that the preparation shall conform to the standard which has been adopted. The official drugs to which these methods of assay have been applied in the following pages, are the members of the digitalis group, cannabis, and aconite and the suprarenal gland.

Brief descriptions of the more commonly accepted methods are given here in order, first, to direct the attention of manufacturers to them; second, to ascertain the points of weakness which may exist in them; and finally, to outline methods and establish standards which those interested may adopt should they desire to assay their products and have them conform to the standards proposed.

All preparations thus assayed and made to conform to these standards may be labeled "Physiologically assayed and standardized according to the U.S.P. IX."

In the case of Cannabis and its preparations, the biological assay standards are compulsory.

CANNABIS

The assay of Cannabis and its preparations has been made a requirement and is based upon the fact that this drug produces certain symptoms of muscular incoordination. The method consists of ascertaining the dose of the preparation to be tested which will produce these symptoms of incoördination in dogs and then adjusting its strength by comparison with a standard preparation.

Dogs.—The animals differ considerably in susceptibility to the drug and therefore it is best to make preliminary tests upon several dogs with average-sized doses and select from among them the animals which react easily to the drug. As a rule, fox terriers serve very well for the purpose, but any dog may prove satisfactory. It is best to provide at least two dogs for each assay but if many samples are to be examined more dogs will be needed. The dogs should be at least one year old and in normal health and must be kept under the best sanitary conditions. They may be used repeatedly for the purpose but not at shorter intervals than three days. Each series of tests should be conducted by the same person, who should be perfectly familiar with the peculiarities of each animal in order that he may recognize more certainly deviations from the normal. While the tests are being made the animals should be kept in a perfectly quiet room, free from disturbance and separated so that they cannot see each other.

Preparation of the Drug.—The drug may be given most conveniently in the form of the fluidextract which is administered in gelatin capsules, or the extract made into soft pills may be used; but whichever form is chosen the same should be used for both the standard and the preparation that is to be tested.

Before administration the animal should not be fed for twenty-four hours in order to hasten absorption. The head of the animal being held, its mouth is opened and the capsule or pill is placed upon the back of the tongue. Usually the drug is easily swallowed when given in this way, but this may be facilitated by giving the animal a small amount of water to drink.

Assay.—An average dose of the known or standard preparation is given to one of the dogs and a like dose of the preparation to be standardized is given the second dog. After one hour both dogs are observed very carefully for symptoms of muscular incoördination. The incoördination is manifested differently in different animals, but in small doses it shows itself most frequently in slight swaying, when the animal is standing quietly, or in some ataxia when it runs about. The observation should be made frequently during the second hour following the administration of the drug.

The results obtained from the first test should be confirmed after an interval of not less than three days by repeating the administration but reversing the order, that is, giving the known strength drug to the dog which received that of unknown strength before and *vice versa*.

In subsequent tests which are carried out, the dose of the preparation of unknown strength is modified so as to produce similar symptoms to those produced by the standard. If the preparation to be tested is below the standard in strength, its dose must be increased, or if it is above strength its dose is lessened until equivalent doses of the two are found. Dogs may be used over long periods of time, even for some years, but occasionally they have to be discarded, as in some cases they seem to learn the effects of the drug and so refuse to stand up. A certain degree of tolerance is sometimes gained which necessitates larger doses.

Standard.—As there is no chemical substance of definite composition which can be adopted as a standard, a Fluidextract of Cannabis or an extract which has been carefully prepared and suitably preserved may be utilized for this purpose. A standard Fluidextract will produce incoördination when administered to dogs in the dose of 0.03 mil for each kilogramme of body weight of dog. When administered in the form of the Extract a dose of 0.004 Gm. for each kilogramme of body weight of dog should produce similar symptoms, and the requirement for a standard tincture is a dose of 0.3 mil for each kilogramme of body weight of dog.

Aconite

The method for the physiological assay of Aconite depends upon the determination of the minimum lethal dose for guinea-pigs.

Method.—The guinea-pigs to be utilized should be of average size and not too large; preferably from 250 to 350 Gm. in weight and in healthy condition.

The drug may be administered in the form of fluidextract, extract, or tincture, which in the preliminary trial may be injected subcutaneously into a series of guinea-pigs in doses having sufficiently wide limits. If the extract is to be standardized, it must be dissolved in sufficient solvent to produce a liquid preparation before injection. The animals after injection are placed in cages and at the end of the observation (twelve hours), note is taken of those living and dead.

After this preliminary test, the limits of the doses for a second series of animals are further narrowed and, if necessary to still further confirm the earlier results, additional series may be injected until the minimum lethal dose for the guinea-pig is found.

Standard.—A satisfactory preparation of the Fluidextract of Aconite should kill guinea-pigs when administered in doses of 0.00004 mil for each gramme of body weight of guinea-pig; a satisfactory Tincture of Aconite should prove fatal to guinea-pigs when given in doses of 0.0004 mil for each gramme of body weight of guinea-pig and a satisfactory Extract of Aconite should have a minimum lethal dose not greater than 0.00001 Gm. for each gramme of body weight of guinea-pig.

Digitalis—Strophanthus—Squill

For the members of the digitalis series the so-called "one hour frog" method is recommended. This method consists essentially in ascertaining the dose of a drug or preparation which will bring the heart of a standard sized frog to systolic standstill in one hour's time. The method is carried out as described below; all measurements being performed with the same degree of accuracy used in ordinary quantitative chemical estimations.

Frogs.—The frogs to be employed in an assay should be in a healthy condition and of the same species. Those most commonly obtainable in this country are the common grass frogs (*Rana viridis* or *Rana pipiens*). While the dose for a frog is estimated according to its weight, it is best to use frogs of a fairly uniform size, the most convenient weight for such work being between 15 and 25 Gm.

Storage.—Before use the frogs should be stored in tanks kept in a cool room, preferably where the temperature does not rise above 15° C. The bottom of the tanks should be covered with running water or, if running water is not convenient, standing water may be used if it is changed from two to four times daily. An hour before the frogs are to be used for an assay a sufficient number should be taken to the operating room, each one carefully weighed to within 0.1 Gm. and placed in an individual wire cage or container, these are then placed in a tank containing water to the depth of about 1 cm. (½ inch) which is kept during the process of assay at a uniform temperature of 20° C. The maintaining of a uniform temperature at which all assays of the members of this group should be carried out is important, as the susceptibility of frogs differs very considerably at different temperatures.

Dosage.—After the frogs have been weighed as described, the doses to be given are calculated according to their weights and are measured into small conical glasses by means of a finely graduated pipette. The doses of the preparation which are to be injected should be as uniform in quantity as possible and should not exceed 0.015 mil for each gramme of body weight of frog. The members of the digitalis series may be assayed in either fluidextract or tincture strength, being diluted with water as may be necessary to get the volume dose. In case the alcohol content in any preparation after dilution is higher than 20 per cent., the preparation may be subjected to careful evaporation and subsequent dilution with an aqueous solution containing 0.7 per cent. of sodium chloride until the original volume is restored and the alcohol content is not above the per cent. named. It is always best to have the alcohol content of different preparations uniform. In case there is a precipitate the preparation to be assayed should be shaken each time a dose is measured out.

When the doses are ready, they may be injected into the anterior lymph sac of the animal. This is done by means of a glass pipette which is drawn out to a fine point. The frog is held on its back in one hand and the pipette with the contained drug in the other, the mouth of the frog is opened with the point of the pipette and, carefully avoiding the tongue, the floor of the mouth is punctured and the point of the pipette is then seen to enter the anterior lymph sac of the frog. The contents of the pipette are now forced into the sac either by gravity or by gently blowing, if necessary. In the latter case, care should be taken not to introduce air into the sac. Care should also be taken not to puncture the skin. The animal is then replaced in its cage in the tank, the temperature of which is maintained as stated at 20° C.

At the end of one hour from the time of injection each frog is pithed, both brain and cord, the heart is exposed and its condition examined. For the correct end reaction the ventricle should be in systolic standstill while the auricles should be widely dilated.

Following mechanical stimulation feeble contractions may be allowed in the auricles and localized contractions in the ventricle, but no general contraction is allowable.

If when the heart of an animal is being exposed for examination, remains of the injected drug are found in the lymph sac unabsorbed, such an animal should be discarded and not considered in the results obtained.

It happens sometimes that one frog out of a large series may prove a decided exception to the others in the way of increased or decreased susceptibility to the drug. Such an animal should also be discarded.

After the primary or trial assay has been carried out and the approximate strength of the preparation ascertained, a second series of frogs is injected in like manner, using doses the limits of which are considerably narrower than the first series. A third or even fourth series of injections may be necessary to confirm the earlier results. The dose thus found is then compared with the dose of a standard which is similarly ascertained upon another series of frogs of the same lot. From such a comparison the strength of the unknown preparation can be suitably adjusted.

The use of a standard is made necessary by the fact that frogs differ in their susceptibility to the members of the digitalis series at different seasons of the year. The condition of susceptibility is ascertained and allowed for by the use of a solution of ouabain (see page 541) as a standard which in appropriate doses is injected into a series of frogs and their resistance thus determined. The necessary strength of an unknown preparation may be calculated from the dose actually found by the ratio of the standard dose of ouabain to the dose of ouabain found necessary to kill. Thus:

Standard dose of ouabain	:	Found dose of ouabain	: :	Standard dose of drug being assayed	:	Necessary dose of unknown

The standard dose of ouabain is 0.0000005 Gm. per gramme of body weight of frog.

The standard dose of Tincture of Digitalis to correspond is 0.006 mil per gramme of body weight of frog.

If, therefore, in a certain series of frogs the resistance to ouabain is found to be increased so that a dose of 0.00000075 Gm. is necessary to stop the heart in systole in one hour, the dose of Tincture of Digitalis would also have to be increased to 0.009 mil, and the actual dose found calculated against this, instead of against the standard dose of 0.006 mil. For example, in frogs showing the increased resistance as indicated above, if the Tincture being examined assays 0.018 mil per gramme of body weight it is one-half strength.

Standards.—The standards adopted are as follows:

	Gramme or mil for each gramme of body weight of frog.
Standard dose of ouabain	0.0000005
Digitalis	
Leaves (in the form of tincture)	0.0006
Fluidextract	0.0006
Tincture	0.006
Strophanthus	
Seed (in the form of tincture)	0.000006
Tincture	0.00006
Squill	
Dried Squill (in the form of tincture)	0.0006
Fluidextract	0.0006
Tincture	0.006

Suprarenal Gland

The assay of products of the Suprarenal Gland is carried out by means of a comparison of the rise in blood-pressure produced in a dog by an injection of an aqueous preparation of the gland with that produced by a solution of known strength of lævo-methylamino-ethanol-catechol ($C_9H_{13}NO_3$) (see page 536).

Standard Solution.—Prepare an aqueous solution of lævo-methylamino-ethanol-catechol (1 in 1000), using sufficient diluted hydrochloric acid, and from this solution prepare a second solution of the strength of 1 in 100,000 by adding 1 mil of the original solution (1 in 1000) to 99 mils of physiological solution of sodium chloride; this latter solution should be freshly prepared for each assay.

Prepare a solution by adding 1 Gm. of the finely powdered dried suprarenal glands to be tested to 100 mils of distilled water containing 10 mils of diluted hydrochloric acid, allow this mixture to macerate during twenty-four hours, shaking it frequently during that time, and then filter through a dry filter. It is then ready for use.

Dogs.—The animal, which should be of medium size, is anesthetized with a suitable anesthetic. The animal is prepared for blood-pressure estimations in the usual manner by the insertion of a suitable cannula into one carotid artery and this in turn is connected with an ordinary mercury manometer. The trachea is exposed and a cannula inserted into it so that the animal may receive artificial respiration during the course of the experiment.

The femoral vein on each side is exposed and a cannula inserted in each. These should be fitted with short pieces of small rubber tubing to serve as connections for the injecting syringes.

Two glass syringes graduated to 0.05 mil should be provided, one to be used for injecting the standard and the other for the aqueous preparation of the gland.

Before the test is made, in case any muscular movement such as twitching is present, the dog should receive by intravenous injection, a sufficient dose of curare (see page 530), but if the animal is deeply anesthetized, this may not be necessary. The dog should also receive a sufficient dose of atropine sulphate (0.001 to 0.002 Gm.) to paralyze the vagi, this paralysis being proved by electrical stimulation.

The blood-pressure tracing may be best taken on a long kymograph, which may be allowed to run from the time of injection until after the crest of the pressure rise has been passed, when it may be stopped.

Injections should be made at regular intervals and these intervals should not be shorter than five minutes.

One cannula and one syringe are now filled with the standard solution prepared as directed above and 1 mil is injected. The rise of blood-pressure should be submaximal, say from 30 to 60 mm., and in case this figure is much exceeded a second injection of 0.5 mil may be made five minutes later. After a satisfactory dose has been ascertained, 1 mil of the aqueous preparation of the gland may be injected with the second syringe into the femoral vein of the opposite side. In subsequent injections this dose may be increased or decreased as necessary until such an amount is found as will give the same elevation of blood-pressure as the established dose of the standard solution when the two solutions are given in alternating doses. When this relation has been ascertained, it should be confirmed on the same animal by making the injection into the opposite sides from which they have been made in the earlier tests. Before these confirmatory tests are made, it is necessary to wash out the cannulas most carefully before the new solutions are introduced.

The ratio of activity found between these two solutions may be confirmed by injections made into a second animal, using a new aqueous extract of the gland prepared in the same manner as the first.

From the results thus obtained, the strength of the aqueous preparation of the gland may be determined by calculation and expressed in terms which indicate its relative activity as compared with that of the standard.

Standard.—One gramme of *Suprarenalum Siccum* contains the equivalent of 10 milligrammes of lævo-methylamino-ethanol-catechol.

Standard Thermometers

General Requirements.—The bulbs are to be of Jena 16 III normal glass or Corning normal thermometer glass. The stems may be made of other white enamel back glass tubing having a circular cross section; the diameter of the capillary must not be greater than 0.1 mm. The diameter of the stem is to be 5.5 mm. (to within ± 0.3 mm.), and the maximum diameter of the bulb must not be greater than the diameter of the stem. The thermometers are to have a pear-shaped reservoir at the upper end of the capillary having a volume at least equal to the volume of the entire graduated portion of the stem. The upper end of the stem is to have a small glass ring.

Graduation.—The thermometers are all to be graduated into 0.5° (one-half degree) intervals. The 1° graduation marks are to be longer than those for the half degrees, the longer graduations extending, preferably, equally to the right and left of the shorter marks. The graduation marks are to be clean cut and fine, and to be uniformly well-filled with insoluble colored pigment.

Numbering.—The 100° graduations (the 0°, 100°, 200°, 300° graduations on the different thermometers) are to be numbered in full and the intermediate 5° and 10° graduations are to be numbered 5, 10, 15, etc. . . . 95, 100, 5, 10, 15, . . . 95, 200, 5, 10, etc. The numbers must be distinct and easily legible and preferably in such position that they will be upright when the thermometer is vertical. The figures should not be unduly large. It is suggested that the figures opposite the 0°, 100°, 200°, 300° graduations be made about 2 mm. in height and the intermediate numbers 5, 10, 15, etc., somewhat less (about 1.4 mm.).

Annealing.—The thermometers should be so thoroughly annealed that there will be no appreciable change in their indications after long continued exposure to the highest temperature on the scale.

Error of Scale.—The maximum error at any temperature below 100° C. must not exceed 0.5°, nor exceed 1.0° in the interval 100° to 350° C.

Standardization.—The thermometers should be submitted to the Bureau of Standards for standardization or carefully compared with thermometers actually standardized by the Bureau of Standards.

Filling Under Pressure.—Thermometers reading over 200° C. must be filled under sufficient pressure to prevent the mercury column from boiling or breaking up into small pieces.

Thermometer No. 1.—The thermometer is to be graduated from −10.5° to 125.5° C. into half degrees, the length of a 1° interval being 1.5 to 2 mm.

Thermometer No. 2.—The thermometer is to be graduated from 98° to 225.5° C. into half degrees, the length of a 1° interval being 1.5 to 2 mm. The graduations to begin a short distance above top of bulb so that the distance from first graduation (98°) to bottom end of bulb shall be not over 40 mm.

Thermometer No. 2A.—The thermometer is to be graduated into half degrees in the neighborhood of ice point from 1° to 2°, above which is to be a small enlargement in the capillary, and then a graduated portion extending from 98° to 250.5° C., the length of a 1° interval being 1.5 to 2 mm. The length of the thermometer between the 98° mark and the lower end of the main bulb should not exceed 65 mm.

Thermometer No. 3.—The thermometer is to be graduated from 198° to 350.5° C. into half degrees, the length of a 1° interval being 1.5 to 2 mm. The graduations to begin a short distance above the top of the bulb so that the distance from the first graduation (198°) to the bottom end of the bulb shall be not over 40 mm. The graduated stem to be the same length as Nos. 1 and 2.

Thermometer No. 3A.—The thermometer is to be graduated into half degrees in the neighborhood of the ice point from −1° to 4°, above which is to be a small enlargement in the capillary, and then a graduated portion extending from 198° to 350.5° C., the length of a 1° interval being 1.5 to 2 mm. The length of the thermometer between the 198° mark and the lower end of the main bulb should not exceed 65 mm.

Auxiliary Thermometer.—This thermometer is for emergent stem corrections. Use a standard thermometer from 15 to 20 cm. in length and graduated from 20° to 100° C., into degrees.

Thermometers for Boiling Points.—In order to avoid the necessity of an emergent stem correction, it is advisable that an accurately standardized thermometer of the Anschütz type be used for boiling points. If such a thermometer is not available, a thermometer such as is specified above (see No. 1, 2, or 3) may be employed, applying the emergent stem correction as described under *Melting Points* (see page 597), the length of emergent stem being measured, in degrees, from the lower end of the stopper to the highest point of the boiling temperature.

Powders

Fineness of Powders and Granular Substances

The fineness of powders and granular substances is expressed, in the Pharmacopœia, by numbers which originally represented only the meshes per inch of the sieve through which the powders would pass. Fineness, so used, has been redefined below in terms of the maximum diameter of the particles of the powder as measured by the width of opening of the meshes of the sieves from which they receive their designating numbers. A powder of a specified number must meet the requirements given below for that number of powder, but the larger proportion of it must not pass through a sieve of a lower degree of fineness.

Number of Powder.		Diameter of Particles.
No. 100	Powder has a fineness, in diameter of particles, less than	0.14 millimeter.
No. 80 Very fine powder	Powder has a fineness, in diameter of particles, less than	0.17 millimeter.
No. 60 Fine powder	Powder has a fineness, in diameter of particles, less than	0.23 millimeter.
No. 50 Moderately fine powder	Powder has a fineness, in diameter of particles, less than	0.28 millimeter.
No. 40 Moderately coarse powder	Powder has a fineness, in diameter of particles, less than	0.38 millimeter.
No. 30	Powder has a fineness, in diameter of particles, less than	0.54 millimeter.
No. 20 Coarse powder	Powder has a fineness, in diameter of particles, less than	0.85 millimeter.
No. 12 Very coarse powder	Powder has a fineness, in diameter of particles, less than	1.47 millimeters.
No. 6	Powder has a fineness, in diameter of particles, less than	3.00 millimeters.

The degrees of fineness defined above shall be such as are determined by sieving tests made with sieves of the Standard Screen Scale recommended by the Bureau of Standards.

Percolation

Percolation, as directed in this Pharmacopœia, consists in subjecting a comminuted substance or a mixture of substances, contained in a vessel called a percolator, to the solvent action of successive portions of a liquid termed the menstruum in such a manner that the liquid, as it traverses the powder in its descent to the receiver, shall extract the soluble constituents, and pass from the percolator free from insoluble matter.

When the process is successfully conducted, the first portion of the liquid, or percolate, passing through the percolator will be nearly saturated with the soluble constituents of the substance treated; and if the quantity of menstruum be sufficient for its exhaustion, the last portion of the percolate will be nearly free from color, odor, and taste, other than those of the menstruum itself.

In preparations which direct the process of percolation, wherever the expression " until the drug is exhausted " or a similar phrase occurs, it is to be understood that the term "exhausted" means the point at which the valuable constituents have been as completely extracted as is possible or practical, and this must be determined by the judgment and experience of the operator.

Percolators.—The following statement with regard to percolators and the process of percolation is given in order to illustrate a method of percolation. It is not intended as compulsory and it is permissible for manufacturers and others to modify the process to suit their needs. The percolator most suitable for the quantities contemplated by this Pharmacopœia should be nearly cylindrical, or slightly conical, with a funnel-shaped termination at the smaller end. The neck of this funnel-end should be rather short, and should gradually and regularly become wider toward the orifice, so that a perforated cork, bearing a short glass tube, may be tightly wedged into it. The glass tube, which must not project above the inner surface of the cork, should extend from 3 to 4 cm. beyond the outer surface of the cork, and should be provided with a closely fitting rubber tube, at least one-fourth longer than the percolator itself, and ending in another short glass tube, whereby (when it is desired to interrupt the percolation) the rubber tube may be so suspended that its orifice shall be above the surface of the menstruum in the percolator, a rubber band holding the tube in position.

The shape of a percolator should be adapted to the nature of the drug to be operated upon. For drugs which are apt to swell, particularly when a feebly alcoholic or an aqueous menstruum is employed, a *conical* percolator is preferable. A *cylindrical* or only slightly tapering percolator may be used for drugs which are not liable to swell, particularly if difficult to exhaust, also when the menstruum is strongly alcoholic, or when ether or some other volatile liquid is used for extraction. The size of the percolator selected should be in proportion to the quantity of drug extracted. When properly packed in the percolator, the drug should not occupy more than two-thirds of its height. The percolator is best constructed of glass, but, unless otherwise directed, may be made of any suitable material not affected by the drug or menstruum. For hot percolation glass percolators are unsuited, as they are liable to fracture. Metallic percolators in such cases are required.

The percolator is prepared for percolation by gently pressing a small tuft of purified cotton into the neck, and this may then be moistened by pouring a few drops of menstruum upon the cotton, to facilitate the passage of the first portion of percolate, which is often very dense.

The Process.—The powdered substance to be percolated (which should be uniformly of the fineness directed in the formula, and should be perfectly air-dry before it is weighed) is put into a suitable dish, sufficient menstruum is poured on, and the powder thoroughly stirred until it is uniformly moistened. The moist powder is then passed through a coarse sieve—No. 40 powders, and those which are finer, requiring a No. 20 sieve, and No. 30 powders require a No. 15 sieve for this purpose. Powders of a less degree of fineness usually do not require this additional treatment after the moistening. The moist powder is now transferred to a sheet of thick paper and the whole quantity poured from this into the percolator. It is then shaken down lightly and allowed to remain in that condition for a period varying from fifteen minutes to several hours, unless otherwise directed; after which the powder is pressed, by the aid of a plunger of suitable dimensions, more or less firmly, in proportion to the character of the powdered substance and the alcoholic strength of the menstruum, strongly alcoholic menstrua, as a rule, permitting firmer packing of the powder than the weaker. The percolator is now placed in position for percolation, and, the rubber tube having been fastened at a suitable height, the surface of the powder is covered by an accurately fitting disk of filtering paper, held in place by a glass stopper or percolator weight, and a sufficient quantity of the menstruum poured on through a funnel reaching nearly to the surface of the paper. If these conditions are accurately observed, the menstruum will penetrate the powder equally until it has passed into the rubber tube and has reached, in this, a height corresponding to its level in the percolator, which is now closely covered to prevent evaporation. The apparatus is then allowed to stand at rest for the time for maceration specified in the formula.

To begin percolation, the rubber tube is lowered and its glass end introduced into the neck of a bottle previously marked for a quantity of liquid to be received, if the percolate is to be measured, or of a tared bottle, if the percolate is to be weighed; and by raising or lowering this receiver the rapidity of percolation may be increased or decreased as may be desirable. A layer of menstruum must constantly be maintained above the powder, so as to prevent the access of air to its interstices, until all has been added, or the requisite quantity of percolate has been obtained. This is conveniently accomplished, if the space above the powder will admit of it, by inverting a bottle containing the entire quantity of menstruum over the percolator in such a manner that its mouth may dip beneath the surface of the liquid, the bottle being of such shape that its shoulder will serve as a cover for the percolator.

Unless otherwise directed when the dregs of a tincture, or of a similar preparation, are to be subjected to percolation, after maceration with all or with the greater portion of the menstruum, the liquid portion should be drained off as completely as possible, the solid portion packed in a percolator, as before described, and the liquid poured on, until all has passed from the surface, when immediately a sufficient quantity of the directed menstruum should be poured on to displace the retained liquid, until the prescribed quantity has been obtained.

Repercolation or Fractional Percolation.—Authority is given to employ, where it may be applicable, the process of repercolation, without change of the initial menstruum. This process is used in Type Process C for fluidextracts (see page 175).

Rate of Flow.—It is obvious that the success of the process of percolation largely depends upon the regulation of the flow of the percolate; if this should be too rapid, incomplete exhaustion will result, but if too slow, valuable time may be wasted. The rate of flow for fluidextracts for 1000 Gm. of powder should not exceed ten drops a minute; for official quantities of tinctures and preparations of about the same strength twenty drops a minute, and the word "slowly" throughout the text is understood to mean a rate of flow corresponding to this; it is evident that the proper rate of flow should vary with the quantity and character of the drug employed and the density of the menstruum.

Maceration.—Percolation is not suitable for exhausting some drugs, and the process of maceration is employed for some of the tinctures (Aloes, Asafetida, Sweet Orange Peel, Tolu, etc.). Specific directions will be found in the text, and maceration should be conducted preferably at a temperature of from 15° to 20° C.

Sterilization

The term "Sterilization" as employed in the practice of medicine and pharmacy means the destruction or removal of bacteria or their spores and other living organisms. This may be accomplished in various ways, depending upon the nature of the material to be sterilized.

A sterile condition can be maintained only so long as the substance or material is kept from contact with air or other media which may carry micro-organisms.

The important subject of sterilization cannot be treated with any great degree of particularity, nor can the intricate details of scientific technique be fully described in this Chapter.

Glass and Metal Utensils.—These may be sterilized by heating them from 160° to 170° C. for two hours in a hot-air sterilizing oven, or in a closed vessel (autoclave) under steam pressure at a temperature of from 115° to 120° C. for fifteen minutes. Heating in a current of steam for thirty minutes, or thoroughly boiling for fifteen minutes in water, or in an aqueous solution of sodium bicarbonate (1 in 1000) will kill all nonspore-bearing organisms and some spore-bearing organisms. As the presence of even a minute quantity of alkali is objectionable in glass containers in certain cases, the process of sterilization should in such instances be preceded by a thorough cleansing of the bottle, ampul or other receptacle with dilute hydrochloric acid, 1 per cent., followed by a thorough rinsing with distilled water.

Stoppers.—Rubber stoppers only should be used for containers and these should be sterilized before use. Cork stoppers should not be used.

Medicinal Solutions Not Easily Decomposed by Heat.—Solutions which are not injured by high temperatures should be sterilized in a current of steam, in an oven, or in a closed apparatus (autoclave) by steam under pressure.

Sterilization in a current of steam should not be concluded in less than thirty minutes and the heat should preferably be continued for one hour; an exposure of from fifteen to twenty minutes is sufficient if the sterilization is carried out in a pressure apparatus at a temperature of from 115° to 120° C.

Wrap the utensils or containers in parchment paper before starting sterilization for protection against contamination and do not remove the paper until the solution is to be used.

Medicinal Solutions of Substances Readily Decomposed by Heat.—Solutions of substances which are decomposed when subjected to the heat and manipulation directed in the preceding paragraph (this includes solutions of many alkaloids) may be prepared in an approximately sterile condition as directed below:

Method 1.—Filter the solution through a stone or porcelain filter which has previously been tested to prove its efficiency in removing bacteria.

Method 2.—Sterilize all utensils necessary for weighing, such as scales, spatulas, etc., either in steam or, immediately before use, by a thorough cleansing, first with purified cotton saturated with alcohol, then with cotton saturated with ether. Then dissolve the substance in a sterilized, glass-stoppered container, holding the required amount of sterilized distilled water. Should the solution require filtration, use a sterilized funnel and filter paper and collect the filtrate in a sterilized container, closing it with a sterilized rubber stopper. The filtration must be conducted in such a manner that no contamination will result.

Emulsions in Glycerin or Oil.—Approximately sterile solutions or emulsions in glycerin or oil may be prepared in the following manner: heat glycerin in a steam sterilizer as described under *Medicinal Solutions Not Easily Decomposed by Heat*, or heat oil for two hours in a dry-air sterilizer at about 120° C., then introduce the medicinal substances after the liquid has cooled. The desired medicament may be incorporated by triturating it in a sterilized mortar containing the previously sterilized medium (glycerin or oil), and the solution or emulsion should then be quickly transferred to a sterilized glass container.

When solutions have been passed through carefully tested porcelain filters and properly collected and kept in sterile containers, they may be considered "sterile."

Surgical Dressings.—Cotton, bandages, gauzes, ligatures, etc., may be rendered sterile by treatment with steam in a pressure apparatus (autoclave) at 115° C. for fifteen minutes or by exposure to dry heat in an ordinary air-bath or sterilizer at a temperature of from 160° to 170° C. for two hours. It should be remembered that all surgical materials are not amenable to such thorough treatment without more or less deterioration taking place. Bandages must be folded or packed in such a manner as to permit the penetration of steam or dry heat during the process and should be so arranged that after the sterilization is completed all subsequent contamination with bacteria will be prevented. This is usually accomplished by immediately enclosing them in glass containers or wrapping them in a number of thicknesses of previously sterilized parchment paper.

Diagnostical Reagents and Clinical Tests

In the following pages of Diagnostical Reagents and Clinical Tests it is understood that the standard for official substances like Iodine, Potassium Iodide, Gelatin, Sodium Chloride, etc., are those to be found in the text of this Pharmacopœia. Where other substances not described in Part I are used a description will be found among the reagents (see pages 521 to 583). If the solutions are not clear filter them.

Reagents for Examination of Urine

For Acetone Reaction

Sodium Nitroprusside (see page 549, used for Legal's test and Lange's test).

Iodine Potassium Iodide Solution (for Lieben's solution):

Potassium Iodide	6 Gm.
Iodine	4 Gm.
Distilled Water, a sufficient quantity,	
To make	100 mils

Dissolve the potassium iodide in the distilled water, add the iodine and shake the mixture frequently until a solution is obtained.

Alcoholic Solution of Iodine (10 per cent.), for Gunning's reaction. To be freshly prepared.

For Albumin Reaction

Glacial Acetic Acid (see page 7).

Acetic Acid (see page 6).

Potassium Ferrocyanide (see page 545).

Nitric Acid (see page 18).

Saturated Aqueous Solution of Trinitrophenol (see page 471).

Esbach's Reagent:

Trinitrophenol	1 Gm.
Citric Acid	2 Gm.
Distilled Water, a sufficient quantity,	
To make a solution measuring	100 mils

Spiegler-Jolles' Reagent:

Corrosive Mercuric Chloride	2 Gm.
Succinic Acid	4 Gm.
Sodium Chloride	4 Gm.
Distilled Water, a sufficient quantity,	
To make	100 mils

Mix the several ingredients and dissolve them in the distilled water.

Trichloracetic Acid (see page 28).

For Albumose Reaction

Phosphotungstic Acid (see page 543) (Salkowski's test).

For Bile Reactions

UROBILIN

Amyl Alcohol (see page 524).

Solution of Zinc Chloride (about 10 per cent.):

Zinc Chloride	10 Gm.
Distilled Water, a sufficient quantity,	
To make a solution measuring	100 mils

Mixture of Zinc Acetate:

Zinc Acetate	10 Gm.
Dehydrated Alcohol, a sufficient quantity,	———
To make	100 mils

Finely powder the zinc acetate and intimately mix it with the alcohol. Dispense the mixture with directions "to be well shaken before using."

UROBILINOGEN

Ehrlich's Solution:

Paradimethylamidobenzaldehyde	2 Gm.
Hydrochloric Acid	50 mils
Distilled Water, a sufficient quantity,	———
To make a solution measuring	100 mils

BILIARY COLOR REACTIONS

Nitric Acid (containing a trace of nitrous acid).

Solution of Calcium Chloride (about 10 per cent.) (Hupert's reaction):

Calcium Chloride	10 Gm.
Distilled Water, a sufficient quantity,	———
To make a solution measuring	100 mils

Alcoholic Solution of Iodine (about 1 per cent.):

Iodine	1 Gm.
Alcohol, a sufficient quantity,	———
To make a solution measuring	100 mils

For Blood Reaction

Solution of Guaiac:

Guaiac	2 Gm.
Dehydrated Alcohol, a sufficient quantity,	———
To make a solution measuring	100 mils

Oxygenated Oil of Turpentine.

Ether containing Hydrogen Dioxide.

Aloin, isobarbaloin containing barbaloin.

For Diacetic Acid Reaction

Solution of Ferric Chloride (see page 240) used for Gerhardt's test.

For Diazo Reaction, Ehrlich

1. Sodium Nitrite	1 Gm.
Distilled Water, a sufficient quantity,	———
To make	200 mils
2. Sulphanilic Acid	5 Gm.
Hydrochloric Acid	50 mils
Distilled Water, a sufficient quantity,	———
To make	1000 mils

Dissolve the sulphanilic acid in about 700 mils of distilled water to which the hydrochloric acid has been added and follow with enough distilled water to make the product measure 1000 mils.

For use, 1 mil of the sodium nitrite solution should be mixed with 50 mils of the sulphanilic acid solution.

For Indican Reactions

Solution of Chlorinated Lime:

A saturated solution of chlorinated lime diluted with an equal volume of distilled water and filtered.

Obermeyer's Solution:

Ferric Chloride	0.4 Gm.
Hydrochloric Acid, a sufficient quantity,	
To make a solution measuring	100 mils

Solution of Lead Acetate:

Lead Acetate	25 Gm.
Distilled Water, a sufficient quantity,	
To make a solution measuring	100 mils

For Pentose Reactions

Bial's Reagent:

Orcin	1 Gm.
Hydrochloric Acid	500 mils
Solution of Ferric Chloride	25 drops

Dissolve the orcin in the hydrochloric acid and add the solution of ferric chloride.

Phloroglucinol (see page 543).

For the Estimation of Urea

Solution of Sodium Hypobromite:

1. Bromine	125 Gm.
Sodium Bromide	125 Gm.
Distilled Water, a sufficient quantity,	
To make a solution measuring	1000 mils
2. Sodium Hydroxide	225 Gm.
Distilled Water, a sufficient quantity,	
To make a solution measuring	1000 mils

The reagent should be freshly prepared by mixing equal volumes of solutions 1 and 2 and diluting the resulting mixture with one and a half volumes of distilled water.

For Sugar Reactions

Solution of Sodium Hydroxide:

Sodium Hydroxide	10 Gm.
Distilled Water, a sufficient quantity,	
To make a solution measuring	100 mils

Solution of Copper Sulphate:

Copper Sulphate	10 Gm.
Distilled Water, a sufficient quantity,	
To make a solution measuring	100 mils

Nylander's Reagent:

Potassium and Sodium Tartrate	4 Gm.
Sodium Hydroxide	10 Gm.
Bismuth Subnitrate	2 Gm.
Distilled Water, a sufficient quantity,	
To make	100 mils

Dissolve the potassium and sodium tartrate in 90 mils of distilled water. Add the bismuth subnitrate to the solution, shake the mixture thoroughly and then filter through glass wool. Preserve and dispense this solution in amber-colored bottles.

Fehling's Solution (see Alkaline Cupric Tartrate V.S., page 557).

Pavy's Solution:

1. Copper Sulphate	4.158 Gm.
Distilled Water, a sufficient quantity,	
To make a solution measuring	500 mils
2. Potassium and Sodium Tartrate	20.4 Gm.
Potassium Hydroxide	20.4 Gm.
Stronger Ammonia Water	300.0 mils
Distilled Water, a sufficient quantity,	
To make a solution measuring	500 mils

For use, mix equal quantities of the two solutions.

Phenylhydrazine Hydrochloride (see page 542).

Sodium Acetate: Neutral to litmus paper.

Fermentation test with yeast.

Reagents for the Examination of Gastric Contents

Congo Red Test Paper:

Saturate filter paper with an aqueous solution of Congo Red (1 in 1000), page 579. Dry and cut the paper into strips and preserve them in well-stoppered glass vials.

Saturated Alcoholic Solution of Methylthionine Chloride (*Methylene Blue*) (see page 273).

Alcoholic Solution of Dimethylaminoazobenzene (see page 530) (1 in 200)

Günzburg's Reagent:

Phloroglucinol	2 Gm.
Vanillin	1 Gm.
Alcohol	30 mils

Dissolve the ingredients in the alcohol.

Tenth-normal Hydrochloric Acid V.S. (see page 559): Dilute 1 volume of normal hydrochloric acid V.S. with exactly 9 volumes of distilled water.

Tenth-normal Potassium Hydroxide V.S. (see page 565).

Phenolphthalein (see page 317).

Solution of Rosolic Acid:

Rosolic Acid	1 Gm.
Alcohol, a sufficient quantity,	
To make a solution measuring	100 mils

Carminfibrin:

Heat freshly-drawn beef blood, wash the stringy coagulated fibrin in running water until decolorized, cut the fibrin into small pieces of uniform size and macerate it in alcohol for several days. Then transfer the fibrin for one or two days to a 0.5 per cent. ammoniacal solution of carmine, which contains as little excess of ammonia as possible, and keep it cool until the fibrin is thoroughly stained. Wash the product in distilled water until the wash-water is no longer colored, squeeze it out well, and then preserve it in glycerin. Before using, carefully wash the carminfibrin in distilled water to free it from glycerin.

Reagents for the Examination of Blood

Hayem's Solution:

For red blood-corpuscles:

Sodium Sulphate	5 Gm.
Sodium Chloride	1 Gm.
Corrosive Mercuric Chloride	0.5 Gm.
Distilled Water	200.0 mils

Dissolve the salts in the distilled water and filter.

Toison's Solution:

Methyl Violet 6B	0.025 Gm.
Sodium Chloride	1.000 Gm.
Sodium Sulphate	8.000 Gm.
Glycerin	30.000 mils
Distilled Water	300.000 mils

Dissolve the salts in the distilled water and add the methyl violet and the glycerin.

For white corpuscles:

Acetic Acid (U.S.P.)	1 mil
Distilled Water	99 mils

Mix them.

Solution for Hemoglobin Estimation (Sahli's hemometer):

Tenth-normal hydrochloric acid V.S. saturated with chloroform. This solution should always be freshly prepared and be dispensed in dark amber-colored bottles.

Jenner's Stain:

1. Eosin	0.5 Gm.
*Methyl Alcohol, a sufficient quantity,	
To make a solution measuring	100 mils
2. Methylthionine Chloride (Methylene Blue)	0.5 Gm.
*Methyl Alcohol, a sufficient quantity,	
To make a solution measuring	100 mils

For use mix 25 mils of eosin solution with 20 mils of methylene blue solution.

Ehrlich's Triacid Stain:

Saturated Aqueous Solution of Orange-G	120 to 125 mils
Saturated Aqueous Solution of Acid Fuchsin	80 to 165 mils
Saturated Aqueous Solution of Methylene Green	125 mils
Distilled Water	300 mils
Dehydrated Alcohol	200 mils
Glycerin	100 mils

Mix.

Wright's Stain:

Wright's Stain (Grübler's dried powder)	0.1 Gm.
*Methyl Alcohol	60.0 mils

Giemsa's Stain:

Azur II-Eosin	0.3 Gm.
Azur II	0.8 Gm.
Glycerin	250.0 mils
*Methyl Alcohol	250.0 mils

Dissolve the dyes in the methyl alcohol and add the glycerin and filter.

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* Rectified wood alcohol, sp. gr. about 0.812 at 25° C.

Stains and Accessories for use in connection with the study of Micro-organisms

Alum-hematoxylin Solution:

Hematoxylin, crystals	1.0 Gm.
Saturated Aqueous Solution of Ammonium Alum	100.0 mils
Distilled Water	300.0 mils
Thymol	0.5 Gm.

Dissolve the hematoxylin in a little distilled water by the aid of heat, add the other ingredients and expose the combined solution to the light, in a bottle loosely stoppered, until it has assumed a dark red color, then filter. The thymol is added as a preservative.

Mayer's Hemalum:

Hematein or its ammonium salt	1.0 Gm.
Alcohol, 90 per cent	50.0 mils
Alum	50.0 Gm.
Distilled Water	1000.0 mils
Thymol	0.5 Gm.

Dissolve the hematein in the alcohol by the aid of heat, add the thymol, and then this solution to the alum dissolved in the distilled water, and then filter. The thymol is added as a preservative.

Alcoholic Solution of Methyl Violet 6B:

Methyl Violet 6B	10 Gm.
Alcohol, a sufficient quantity,	
To make a solution measuring	100 mils

Borax-Methylene Blue Solution:

Methylthionine Chloride (Methylene Blue)	2 Gm.
Boiling Solution of Sodium Borate (1 in 20) a sufficient quantity,	
To make a solution measuring	100 mils

Löffler's Methylene Blue Solution:

Methylthionine Chloride (Methylene Blue)	0.5 Gm.
Alcohol	30.0 mils
Tenth-normal Potassium Hydroxide V.S.	2.0 mils
Distilled Water	98.0 mils

Dissolve the methylene blue in the alcohol, add the potassium hydroxide and distilled water.

Solution of Carbol Methyl Violet:

Alcoholic Solution of Methyl Violet 6B	10 mils
Aqueous Solution of Phenol (1 in 20), a sufficient quantity,	
To make a solution measuring	100 mils

Solution of Carbolfuchsin:

Alcoholic Solution of Fuchsin (1 in 10)	10 mils
Aqueous Solution of Phenol (1 in 20)	100 mils

Mix.

FOR TUBERCLE BACILLI

Solution of Carbolfuchsin (see above).

FOR DECOLORIZING

Ebner's Fluid:

Hydrochloric Acid	2.5 mils
Sodium Chloride	2.5 Gm.
Distilled Water	100.0 mils
Alcohol	500.0 mils

Prepare a solution.

Nitric Acid Solution:

Nitric Acid	30 mils
Distilled Water, a sufficient quantity,	
To make a solution measuring	100 mils

Diluted Alcohol.

Diluted Lugol's Solution (Gram's Iodine Solution):

Iodine	1 Gm.
Potassium Iodide	2 Gm.
Distilled Water, a sufficient quantity,	
To make a solution measuring	200 mils

FOR COUNTER STAINING

Löffler's Methylene Blue Solution (see page 623).

Gram's Stain (Aniline Water—Methyl Violet 6B Solution):

Aniline	15 mils
Saturated Alcoholic Solution of Methyl Violet 6B	7 mils
Dehydrated Alcohol	10 mils
Distilled Water, a sufficient quantity,	
To make	100 mils

Shake the aniline with 65 mils of distilled water for several minutes; filter the resulting opalescent aniline water through a moistened filter, pour the filtrate into a solution prepared by mixing the other liquids and add sufficient distilled water to make 100 mils.

Diluted Carbolfuchsin Solution:

Solution of Carbolfuchsin (see page 623)	1 mil
Distilled Water	4 mils

Prepare a solution.

Accessories

Xylene (see page 553).
Oil of Clove (see page 289).
Oil of Cedarwood (see page 540).
Canada Turpentine (Canada Balsam) (see page 528).

Culture Media

Bouillon Stock:

Lean Beef	500 Gm.
Or Extract of Beef	3 Gm.
Distilled water, a sufficient quantity,	
To make	1000 mils

Mix thoroughly 500 Gm. of finely minced lean beef with 1000 mils of cold distilled water, heat it to boiling in a closely covered dish or flask and keep it at that temperature for one hour. If extract of beef is used to make bouillon stock, boil the solution for one-half hour. Filter the resulting bouillon through a well-wetted filter, until clear and use it as the basis for the following combinations:

Plain Bouillon:

Peptone	10 Gm.
Sodium Chloride	5 Gm.
Normal Sodium Hydroxide V.S.	
Bouillon Stock, each a sufficient quantity,	
To make	1000 mils

Dissolve the peptone and sodium chloride in the bouillon stock by means of heat and add sufficient normal sodium hydroxide V.S. to make the mixture neutral to litmus. Then filter the product through a well-wetted filter, fill it into suitable containers and sterilize.

Glucose Bouillon:

Glucose (dry)	10 Gm.
Peptone	10 Gm.
Sodium Chloride	5 Gm.
Normal Sodium Hydroxide V.S.	
Bouillon Stock, each, a sufficient quantity,	
To make	1000 mils

Dissolve the glucose, peptone, and sodium chloride in the bouillon stock by means of heat and add sufficient normal sodium hydroxide V.S. to neutralize the resulting solution. Then filter the product through a well-wetted filter, fill it into suitable containers and sterilize by the discontinuous method.

Plain Gelatin:

Gelatin	100 Gm.
Peptone	10 Gm.
Sodium Chloride	5 Gm.
Normal Sodium Hydroxide V.S.	
Bouillon Stock, each, a sufficient quantity,	
To make	1000 mils

Dissolve the gelatin, peptone, and sodium chloride in the bouillon stock by means of heat and add sufficient normal sodium hydroxide V.S. to neutralize the resulting mixture. Filter the warmed product through filter paper, fill it into suitable containers and sterilize by the discontinuous method.

Glucose Gelatin:

Glucose (dry)	10 Gm.
Gelatin	100 Gm.
Peptone	10 Gm.
Sodium Chloride	5 Gm.
Normal Sodium Hydroxide V.S.	
Bouillon Stock, each, a sufficient quantity,	
To make	1000 mils

Dissolve the glucose, gelatin, peptone, and sodium chloride in the bouillon stock by means of heat and add sufficient normal sodium hydroxide V.S. to neutralize the resulting mixture. Then filter the product through paper, fill it into suitable containers and sterilize by the discontinuous method.

Plain Agar-agar:

Agar	15 Gm.
Peptone	10 Gm.
Sodium Chloride	5 Gm.
Normal Sodium Hydroxide V.S.	
Bouillon Stock, each, a sufficient quantity,	
To make	1000 mils

Dissolve the agar, peptone, and sodium chloride in the bouillon stock by means of heat and add a sufficient quantity of normal sodium hydroxide V.S. to neutralize the resulting mixture. Then filter the warmed product through paper, fill it into suitable containers and sterilize.

Glucose Agar-agar:

Glucose (dry)	10 Gm.
Agar	15 Gm.
Peptone	10 Gm.
Sodium Chloride	5 Gm.
Normal Sodium Hydroxide V.S.	
Bouillon Stock, each, a sufficient quantity,	
To make	1000 mils

Dissolve the glucose, peptone, and sodium chloride in the bouillon stock by means of heat, and add a sufficient quantity of normal sodium hydroxide V.S. to neutralize the resulting mixture. Then filter the warmed product through paper, fill it into suitable containers and sterilize by the discontinuous method.

Glycerin Agar-agar:

Glycerin	60 mils
Agar	15 Gm.
Peptone	10 Gm.
Sodium Chloride	5 Gm.
Normal Sodium Hydroxide V.S.	
Bouillon Stock, each, a sufficient quantity,	
To make	1000 mils

Dissolve the glycerin, agar, peptone, and sodium chloride in the bouillon stock by means of heat and add a sufficient quantity of normal sodium hydroxide V.S. to neutralize the resulting mixture. Then filter the warmed product through paper to fill it into suitable containers and sterilize.

Lactose-litmus Agar-agar:

Sugar of Milk	10 Gm.
Agar	15 Gm.
Peptone	10 Gm.
Sodium Chloride	15 Gm.
Normal Sodium Hydroxide V.S.	
Azolitmin Test Solution (see page 579)	
Bouillon Stock, each, a sufficient quantity,	
To make	1000 mils

Dissolve the sugar of milk, agar, peptone, and sodium chloride in the bouillon stock by means of heat and add a sufficient quantity of normal sodium hydroxide V.S. to neutralize the resulting mixture. Then filter the warmed product through paper, add a sufficient quantity of azolitmin solution to impart to the resulting mixture a pale blue color, fill into suitable containers and sterilize by the discontinuous method.

Blood Serum (Löffler's Mixture):

Glucose Bouillon	250 mils
Horse or Beef Blood Serum	750 mils

Run the mixture of glucose bouillon and beef or horse blood serum into properly sterilized test tubes, and coagulate it by means of heat so as to form a slanting surface for culture purposes.

Thermometric Equivalents

Centigrade and Fahrenheit Scales

Given Centigrade :	Sought Fahrenheit :	Given Fahrenheit :	Sought Centigrade :

$$n^\circ \text{ C.} = \frac{9n^\circ}{5} + 32 \qquad n^\circ \text{ F.} = \frac{5\,(n^\circ - 32)}{9}$$

C.°	F.°	C.°	F.°	C.°	F.°	C.°	F.°
—40	—40						
—39.4444	—39	—24.4444	—12	—9.4444	15	0.5556	33
—39	—38.2	—24	—11.2	—9	15.8	1	33.8
—38.8889	—38	—23.8889	—11	—8.8889	16	1.1111	34
—38.3333	—37	—23.3333	—10	—8.3333	17	1.6667	35
—38	—36.4	—23	—9.4	—8	17.6	2	35.6
—37.7778	—36	—22.7778	—9	—7.7778	18	2.2222	36
—37.2222	—35	—22.2222	—8	—7.2222	19	2.7778	37
—37	—34.6	—22	—7.6	—7	19.4	3	37.4
—36.6667	—34	—21.6667	—7	—6.6667	20	3.3333	38
—36.1111	—33	—21.1111	—6	—6.1111	21	3.8889	39
—36	—32.8	—21	—5.8	—6	21.2	4	39.2
—35.5556	—32	—20.5556	—5	—5.5556	22	4.4444	40
—35	—31	—20	—4	—5	23	5	41
—34.4444	—30	—19.4444	—3	—4.4444	24	5.5556	42
—34	—29.2	—19	—2.2	—4	24.8	6	42.8
—33.8889	—29	—18.8889	—2	—3.8889	25	6.1111	43
—33.3333	—28	—18.3333	—1	—3.3333	26	6.6667	44
—33	—27.4	—18	—0.4	—3	26.6	7	44.6
—32.7778	—27	—17.7778	0	—2.7778	27	7.2222	45
—32.2222	—26	—17.2222	1	—2.2222	28	7.7778	46
—32	—25.6	—17	1.4	—2	28.4	8	46.4
—31.6667	—25	—16.6667	2	—1.6667	29	8.3333	47
—31.1111	—24	—16.1111	3	—1.1111	30	8.8889	48
—31	—23.8	—16	3.2	—1	30.2	9	48.2
—30.5556	—23	—15.5556	4	—0.5556	31	9.4444	49
—30	—22	—15	5	0	32	10	50
—29.4444	—21	—14.4444	6			10.5556	51
—29	—20.2	—14	6.8			11	51.8
—28.8889	—20	—13.8889	7			11.1111	52
—28.3333	—19	—13.3333	8			11.6667	53
—28	—18.4	—13	8.6			12	53.6
—27.7778	—18	—12.7778	9			12.2222	54
—27.2222	—17	—12.2222	10			12.7778	55
—27	—16.6	—12	10.4			13	55.4
—26.6667	—16	—11.6667	11			13.3333	56
—26.1111	—15	—11.1111	12			13.8889	57
—26	—14.8	—11	12.2			14	57.2
—25.5556	—14	—10.5556	13			14.4444	58
—25	—13	—10	14			15	59

Thermometric Equivalents—*Continued*

C.°	F.°	C.°	F.°	C.°	F.°	C.°	F.°
15.5556	60	35.5556	96	55.5556	132	75.5556	168
16	60.8	36	96.8	56	132.8	76	168.8
16.1111	61	36.1111	97	56.1111	133	76.1111	169
16.6667	62	36.6667	98	56.6667	134	76.6667	170
17	62.6	37	98.6	57	134.6	77	170.6
17.2222	63	37.2222	99	57.2222	135	77.2222	171
17.7778	64	37.7778	100	57.7778	136	77.7778	172
18	64.4	38	100.4	58	136.4	78	172.4
18.3333	65	38.3333	101	58.3333	137	78.3333	173
18.8889	66	38.8889	102	58.8889	138	78.8889	174
19	66.2	39	102.2	59	138.2	79	174.2
19.4444	67	39.4444	103	59.4444	139	79.4444	175
20	68	40	104	60	140	80	176
20.5556	69	40.5556	105	60.5556	141	80.5556	177
21	69.8	41	105.8	61	141.8	81	177.8
21.1111	70	41.1111	106	61.1111	142	81.1111	178
21.6667	71	41.6667	107	61.6667	143	81.6667	179
22	71.6	42	107.6	62	143.6	82	179.6
22.2222	72	42.2222	108	62.2222	144	82.2222	180
22.7778	73	42.7778	109	62.7778	145	82.7778	181
23	73.4	43	109.4	63	145.4	83	181.4
23.3333	74	43.3333	110	63.3333	146	83.3333	182
23.8889	75	43.8889	111	63.8889	147	83.8889	183
24	75.2	44	111.2	64	147.2	84	183.2
24.4444	76	44.4444	112	64.4444	148	84.4444	184
25	77	45	113	65	149	85	185
25.5556	78	45.5556	114	65.5556	150	85.5556	186
26	78.8	46	114.8	66	150.8	86	186.8
26.1111	79	46.1111	115	66.1111	151	86.1111	187
26.6667	80	46.6667	116	66.6667	152	86.6667	188
27	80.6	47	116.6	67	152.6	87	188.6
27.2222	81	47.2222	117	67.2222	153	87.2222	189
27.7778	82	47.7778	118	67.7778	154	87.7778	190
28	82.4	48	118.4	68	154.4	88	190.4
28.3333	83	48.3333	119	68.3333	155	88.3333	191
28.8889	84	48.8889	120	68.8889	156	88.8889	192
29	84.2	49	120.2	69	156.2	89	192.2
29.4444	85	49.4444	121	69.4444	157	89.4444	193
30	86	50	122	70	158	90	194
30.5556	87	50.5556	123	70.5556	159	90.5556	195
31	87.8	51	123.8	71	159.8	91	195.8
31.1111	88	51.1111	124	71.1111	160	91.1111	196
31.6667	89	51.6667	125	71.6667	161	91.6667	197
32	89.6	52	125.6	72	161.6	92	197.6
32.2222	90	52.2222	126	72.2222	162	92.2222	198
32.7778	91	52.7778	127	72.7778	163	92.7778	199
33	91.4	53	127.4	73	163.4	93	199.4
33.3333	92	53.3333	128	73.3333	164	93.3333	200
33.8889	93	53.8889	129	73.8889	165	93.8889	201
34	93.2	54	129.2	74	165.2	94	201.2
34.4444	94	54.4444	130	74.4444	166	94.4444	202
35	95	55	131	75	167	95	203

Thermometric Equivalents—*Continued*

C.°	F.°	C.°	F.°	C.°	F.°	C.°	F.°
95.5556	204	115.5556	240	135.5556	276	155.5556	312
96	204.8	116	240.8	136	276.8	156	312.8
96.1111	205	116.1111	241	136.1111	277	156.1111	313
96.6667	206	116.6667	242	136.6667	278	156.6667	314
97	206.6	117	242.6	137	278.6	157	314.6
97.2222	207	117.2222	243	137.2222	279	157.2222	315
97.7778	208	117.7778	244	137.7778	280	157.7778	316
98	208.4	118	244.4	138	280.4	158	316.4
98.3333	209	118.3333	245	138.3333	281	158.3333	317
98.8889	210	118.8889	246	138.8889	282	158.8889	318
99	210.2	119	246.2	139	282.2	159	318.2
99.4444	211	119.4444	247	139.4444	283	159.4444	319
100	212	120	248	140	284	160	320
100.5556	213	120.5556	249	140.5556	285	160.5556	321
101	213.8	121	249.8	141	285.8	161	321.8
101.1111	214	121.1111	250	141.1111	286	161.1111	322
101.6667	215	121.6667	251	141.6667	287	161.6667	323
102	215.6	122	251.6	142	287.6	162	323.6
102.2222	216	122.2222	252	142.2222	288	162.2222	324
102.7778	217	122.7778	253	142.7778	289	162.7778	325
103	217.4	123	253.4	143	289.4	163	325.4
103.3333	218	123.3333	254	143.3333	290	163.3333	326
103.8889	219	123.8889	255	143.8889	291	163.8889	327
104	219.2	124	255.2	144	291.2	164	327.2
104.4444	220	124.4444	256	144.4444	292	164.4444	328
105	221	125	257	145	293	165	329
105.5556	222	125.5556	258	145.5556	294	165.5556	330
106	222.8	126	258.8	146	294.8	166	330.8
106.1111	223	126.1111	259	146.1111	295	166.1111	331
106.6667	224	126.6667	260	146.6667	296	166.6667	332
107	224.6	127	260.6	147	296.6	167	332.6
107.2222	225	127.2222	261	147.2222	297	167.2222	333
107.7778	226	127.7778	262	147.7778	298	167.7778	334
108	226.4	128	262.4	148	298.4	168	334.4
108.3333	227	128.3333	263	148.3333	299	168.3333	335
108.8889	228	128.8889	264	148.8889	300	168.8889	336
109	228.2	129	264.2	149	300.2	169	336.2
109.4444	229	129.4444	265	149.4444	301	169.4444	337
110	230	130	266	150	302	170	338
110.5556	231	130.5556	267	150.5556	303	170.5556	339
111	231.8	131	267.8	151	303.8	171	339.8
111.1111	232	131.1111	268	151.1111	304	171.1111	340
111.6667	233	131.6667	269	151.6667	305	171.6667	341
112	233.6	132	269.6	152	305.6	172	341.6
112.2222	234	132.2222	270	152.2222	306	172.2222	342
112.7778	235	132.7778	271	152.7778	307	172.7778	343
113	235.4	133	271.4	153	307.4	173	343.4
113.3333	236	133.3333	272	153.3333	308	173.3333	344
113.8889	237	133.8889	273	153.8889	309	173.8889	345
114	237.2	134	273.2	154	309.2	174	345.2
114.4444	238	134.4444	274	154.4444	310	174.4444	346
115	239	135	275	155	311	175	347

Thermometric Equivalents—*Continued*

C.°	F.°	C.°	F.°	C.°	F.°	C.°	F.°
175.5556	**348**	195.5556	**384**	215.5556	**420**	235.5556	**456**
176	348.8	**196**	384.8	**216**	420.8	**236**	456.8
176.1111	**349**	196.1111	**385**	216.1111	**421**	236.1111	**457**
176.6667	**350**	196.6667	**386**	216.6667	**422**	236.6667	**458**
177	350.6	**197**	386.6	**217**	422.6	**237**	458.6
177.2222	**351**	197.2222	**387**	217.2222	**423**	237.2222	**459**
177.7778	**352**	197.7778	**388**	217.7778	**424**	237.7778	**460**
178	352.4	**198**	388.4	**218**	424.4	**238**	460.4
178.3333	**353**	198.3333	**389**	218.3333	**425**	238.3333	**461**
178.8889	**354**	198.8889	**390**	218.8889	**426**	238.8889	**462**
179	354.2	**199**	390.2	**219**	426.2	**239**	462.2
179.4444	**355**	199.4444	**391**	219.4444	**427**	239.4444	**463**
180	**356**	**200**	**392**	**220**	**428**	**240**	**464**
180.5556	**357**	200.5556	**393**	220.5556	**429**	240.5556	**465**
181	357.8	**201**	393.8	**221**	429.8	**241**	465.8
181.1111	**358**	201.1111	**394**	221.1111	**430**	241.1111	**466**
181.6667	**359**	201.6667	**395**	221.6667	**431**	241.6667	**467**
182	359.6	**202**	395.6	**222**	431.6	**242**	467.6
182.2222	**360**	202.2222	**396**	222.2222	**432**	242.2222	**468**
182.7778	**361**	202.7778	**397**	222.7778	**433**	242.7778	**469**
183	361.4	**203**	397.4	**223**	433.4	**243**	469.4
183.3333	**362**	203.3333	**398**	223.3333	**434**	243.3333	**470**
183.8889	**363**	203.8889	**399**	223.8889	**435**	243.8889	**471**
184	363.2	**204**	399.2	**224**	435.2	**244**	471.2
184.4444	**364**	204.4444	**400**	224.4444	**436**	244.4444	**472**
185	**365**	**205**	**401**	**225**	**437**	**245**	**473**
185.5556	**366**	205.5556	**402**	225.5556	**438**	245.5556	**474**
186	366.8	**206**	402.8	**226**	438.8	**246**	474.8
186.1111	**367**	206.1111	**403**	226.1111	**439**	246.1111	**475**
186.6667	**368**	206.6667	**404**	226.6667	**440**	246.6667	**476**
187	368.6	**207**	404.6	**227**	440.6	**247**	476.6
187.2222	**369**	207.2222	**405**	227.2222	**441**	247.2222	**477**
187.7778	**370**	207.7778	**406**	227.7778	**442**	247.7778	**478**
188	370.4	**208**	406.4	**228**	442.4	**248**	478.4
188.3333	**371**	208.3333	**407**	228.3333	**443**	248.3333	**479**
188.8889	**372**	208.8889	**408**	228.8889	**444**	248.8889	**480**
189	372.2	**209**	408.2	**229**	444.2	**249**	480.2
189.4444	**373**	209.4444	**409**	229.4444	**445**	249.4444	**481**
190	**374**	**210**	**410**	**230**	**446**	**250**	**482**
190.5556	**375**	210.5556	**411**	230.5556	**447**	250.5556	**483**
191	375.8	**211**	411.8	**231**	447.8	**251**	483.8
191.1111	**376**	211.1111	**412**	231.1111	**448**	251.1111	**484**
191.6667	**377**	211.6667	**413**	231.6667	**449**	251.6667	**485**
192	377.6	**212**	413.6	**232**	449.6	**252**	485.6
192.2222	**378**	212.2222	**414**	232.2222	**450**	252.2222	**486**
192.7778	**379**	212.7778	**415**	232.7778	**451**	252.7778	**487**
193	379.4	**213**	415.4	**233**	451.4	**253**	487.4
193.3333	**380**	213.3333	**416**	233.3333	**452**	253.3333	**488**
193.8889	**381**	213.8889	**417**	233.8889	**453**	253.8889	**489**
194	381.2	**214**	417.2	**234**	453.2	**254**	489.2
194.4444	**382**	214.4444	**418**	234.4444	**454**	254.4444	**490**
195	**383**	**215**	**419**	**235**	**455**	**255**	**491**

Thermometric Equivalents—*Continued*

C.°	F.°	C.°	F.°	C.°	F.°	C.°	F.°
255.5556	492	275.5556	528	295.5556	564	315.5556	600
256	492.8	276	528.8	296	564.8	316	600.8
256.1111	493	276.1111	529	296.1111	565	316.1111	601
256.6667	494	276.6667	530	296.6667	566	316.6667	602
257	494.6	277	530.6	297	566.6	317	602.6
257.2222	495	277.2222	531	297.2222	567	317.2222	603
257.7778	496	277.7778	532	297.7778	568	317.7778	604
258	496.4	278	532.4	298	568.4	318	604.4
258.3333	497	278.3333	533	298.3333	569	318.3333	605
258.8889	498	278.8889	534	298.8889	570	318.8889	606
259	498.2	279	534.2	299	570.2	319	606.2
259.4444	499	279.4444	535	299.4444	571	319.4444	607
260	500	280	536	300	572	320	608
260.5556	501	280.5556	537	300.5556	573	320.5556	609
261	501.8	281	537.8	301	573.8	321	609.8
261.1111	502	281.1111	538	301.1111	574	321.1111	610
261.6667	503	281.6667	539	301.6667	575	321.6667	611
262	503.6	282	539.6	302	575.6	322	611.6
262.2222	504	282.2222	540	302.2222	576	322.2222	612
262.7778	505	282.7778	541	302.7778	577	322.7778	613
263	505.4	283	541.4	303	577.4	323	613.4
263.3333	506	283.3333	542	303.3333	578	323.3333	614
263.8889	507	283.8889	543	303.8889	579	323.8889	615
264	507.2	284	543.2	304	579.2	324	615.2
264.4444	508	284.4444	544	304.4444	580	324.4444	616
265	509	285	545	305	581	325	617
265.5556	510	285.5556	546	305.5556	582	325.5556	618
266	510.8	286	546.8	306	582.8	326	618.8
266.1111	511	286.1111	547	306.1111	583	326.1111	619
266.6667	512	286.6667	548	306.6667	584	326.6667	620
267	512.6	287	548.6	307	584.6	327	620.6
267.2222	513	287.2222	549	307.2222	585	327.2222	621
267.7778	514	287.7778	550	307.7778	586	327.7778	622
268	514.4	288	550.4	308	586.4	328	622.4
268.3333	515	288.3333	551	308.3333	587	328.3333	623
268.8889	516	288.8889	552	308.8889	588	328.8889	624
269	516.2	289	552.2	309	588.2	329	624.2
269.4444	517	289.4444	553	309.4444	589	329.4444	625
270	518	290	554	310	590	330	626
270.5556	519	290.5556	555	310.5556	591	330.5556	627
271	519.8	291	555.8	311	591.8	331	627.8
271.1111	520	291.1111	556	311.1111	592	331.1111	628
271.6667	521	291.6667	557	311.6667	593	331.6667	629
272	521.6	292	557.6	312	593.6	332	629.6
272.2222	522	292.2222	558	312.2222	594	332.2222	630
272.7778	523	292.7778	559	312.7778	595	332.7778	631
273	523.4	293	559.4	313	595.4	333	631.4
273.3333	524	293.3333	560	313.3333	596	333.3333	632
273.8889	525	293.8889	561	313.8889	597	333.8889	633
274	525.2	294	561.2	314	597.2	334	633.2
274.4444	526	294.4444	562	314.4444	598	334.4444	634
275	527	295	563	315	599	335	635

Alcoholometric Table

Temperature 15.56° C.

PERCENTAGE BY VOLUME					PERCENTAGE BY WEIGHT				
Per cent. vol.[‖]	Corresponding per cent. wt.	Sp. gr. app.[*] in air 15.56°/15.56°	Corr.[†] of sp. gr. for barometer (100 mm.)	Fractional[‡] per cent.	Per cent. wt.	Corresponding per cent. vol.	Sp. gr. app.[*] in air 15.56°/15.56°	Corr.[†] of sp. gr. for barometer (100 mm.)	Fractional[‡] per cent.
[§]0	0.000	1.00000	0.000000	0.0667	0	0.000	1.00000	0.000000	0.0532
1	0.795	0.99850	0.000000	0.0680	1	1.257	0.99812	0.000000	0.0543
2	1.593	0.99703	0.000000	0.0690	2	2.510	0.99628	0.000000	0.0565
3	2.392	0.99558	0.000001	0.0714	3	3.758	0.99451	0.000001	0.0588
4	3.194	0.99418	0.000001	0.0730	4	5.002	0.99281	0.000001	0.0610
5	3.998	0.99281	0.000001	0.0746	5	6.243	0.99117	0.000001	0.0641
6	4.804	0.99149	0.000001	0.0781	6	7.479	0.98961	0.000001	0.0671
7	5.612	0.99021	0.000001	0.0813	7	8.712	0.98812	0.000002	0.0680
8	6.422	0.98898	0.000002	0.0833	8	9.943	0.98665	0.000002	0.0700
9	7.234	0.98778	0.000002	0.0840	9	11.169	0.98523	0.000002	0.0719
10	8.047	0.98659	0.000002	0.0855	10	12.393	0.98384	0.000002	0.0746
11	8.862	0.98542	0.000002	0.0877	11	13.613	0.98351	0.000003	0.0769
12	9.679	0.98428	0.000002	0.0901	12	14.832	0.98120	0.000003	0.0775
13	10.497	0.98317	0.000003	0.0917	13	16.047	0.97991	0.000003	0.0800
14	11.317	0.98208	0.000003	0.0943	14	17.259	0.97866	0.000003	0.0820
15	12.138	0.98102	0.000003	0.0943	15	18.469	0.97744	0.000004	0.0840
16	12.961	0.97996	0.000003	0.0962	16	19.676	0.97625	0.000004	0.0833
17	13.786	0.97892	0.000003	0.0990	17	20.880	0.97505	0.000004	0.0826
18	14.612	0.97791	0.000004	0.1000	18	22.081	0.97384	0.000004	0.0813
19	15.440	0.97691	0.000004	0.1020	19	23.278	0.97261	0.000004	0.0806
20	16.269	0.97593	0.000004	0.1000	20	24.472	0.97137	0.000005	0.0794
21	17.100	0.97493	0.000004	0.0990	21	25.662	0.97011	0.000005	0.0781
22	17.933	0.97392	0.000004	0.0980	22	26.849	0.96883	0.000005	0.0769
23	18.768	0.97290	0.000004	0.0962	23	28.032	0.96753	0.000005	0.0752
24	19.604	0.97186	0.000005	0.0952	24	29.210	0.96620	0.000005	0.0740
25	20.443	0.97081	0.000005	0.0943	25	30.388	0.96485	0.000006	0.0719
26	21.285	0.96974	0.000005	0.0926	26	31.555	0.96346	0.000006	0.0694
27	22.127	0.96866	0.000005	0.0909	27	32.719	0.96202	0.000006	0.0667
28	22.973	0.96756	0.000005	0.0893	28	33.879	0.96052	0.000006	0.0649
29	23.820	0.96644	0.000005	0.0877	29	35.033	0.95898	0.000007	0.0633
30	24.670	0.96530	0.000005	0.0862	30	36.181	0.95740	0.000007	0.0613

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[*] Barometer 760 mm. Air one-half saturated with moisture.

[‖] If temperature of observation is above 15.56° C., look for percentage correction in the following table.

[†] Correction subtractive if barometer is above, additive if below, 760 mm. If barometer readings are in inches reduce to millimeters by multiplying by 25.4.

[‡] Corresponding with a difference in specific gravity of 0.0001.

[§] The figures on this line across the page are for fractional percentages below 1.

NOTE: The figures of these Alcoholometric Tables are based on tables issued by the U. S. Bureau of Standards.

Alcoholometric Table—*Continued*

PERCENTAGE BY VOLUME					PERCENTAGE BY WEIGHT				
Per cent. vol.	Corresponding per cent. wt.	Sp. gr. app. in air 15.56°/15.56°	Corr. of sp. gr. for barometer (100 mm.)	Fractional per cent.	Per cent. wt.	Corresponding per cent. vol.	Sp. gr. app. in air 15.56°/15.56°	Corr. of sp. gr. for barometer (100 mm.)	Fractional per cent.
31	25.524	0.96414	0.000006	0.0820	31	37.323	0.95577	0.000007	0.0595
32	26.382	0.96292	0.000006	0.0787	32	38.459	0.95409	0.000007	0.0578
33	27.242	0.96165	0.000006	0.0775	33	39.590	0.95236	0.000007	0.0565
34	28.104	0.96036	0.000006	0.0752	34	40.716	0.95059	0.000008	0.0556
35	28.971	0.95903	0.000006	0.0725	35	41.832	0.94879	0.000008	0.0546
36	29.842	0.95765	0.000007	0.0704	36	42.944	0.94696	0.000008	0.0538
37	30.717	0.95623	0.000007	0.0685	37	44.050	0.94509	0.000009	0.0521
38	31.596	0.95477	0.000007	0.0668	38	45.149	0.94317	0.000009	0.0515
39	32.478	0.95326	0.000007	0.0649	39	46.242	0.94123	0.000009	0.0508
40	33.364	0.95172	0.000007	0.0633	40	47.328	0.93926	0.000010	0.0498
41	34.254	0.95014	0.000008	0.0617	41	48.407	0.93725	0.000010	0.0488
42	35.150	0.94852	0.000008	0.0600	42	49.480	0.93520	0.000010	0.0485
43	36.050	0.94687	0.000008	0.0588	43	50.545	0.93312	0.000011	0.0476
44	36.955	0.94517	0.000009	0.0578	44	51.605	0.93102	0.000011	0.0474
45	37.865	0.94344	0.000009	0.0565	45	52.658	0.92891	0.000011	0.0469
46	38.778	0.94167	0.000009	0.0552	46	53.705	0.92678	0.000012	0.0467
47	39.697	0.93986	0.000009	0.0541	47	54.746	0.92464	0.000012	0.0461
48	40.622	0.93801	0.000010	0.0526	48	55.780	0.92247	0.000012	0.0461
49	41.551	0.93611	0.000010	0.0518	49	56.808	0.92030	0.000013	0.0457
50	42.487	0.93418	0.000010	0.0510	50	57.830	0.91811	0.000013	0.0455
51	43.428	0.93222	0.000011	0.0503	51	58.844	0.91591	0.000013	0.0446
52	44.374	0.93023	0.000011	0.0498	52	59.851	0.91367	0.000014	0.0444
53	45.326	0.92822	0.000011	0.0488	53	60.854	0.91142	0.000014	0.0444
54	46.283	0.92617	0.000012	0.0483	54	61.850	0.90917	0.000014	0.0442
55	47.245	0.92410	0.000012	0.0478	55	62.837	0.90691	0.000015	0.0441
56	48.214	0.92201	0.000012	0.0474	56	63.820	0.90464	0.000015	0.0441
57	49.187	0.91990	0.000013	0.0463	57	64.798	0.90237	0.000015	0.0141
58	50.167	0.91774	0.000013	0.0457	58	65.768	0.90010	0.000016	0.0437
59	51.154	0.91555	0.000013	0.0452	59	66.732	0.89781	0.000016	0.0435
60	52.147	0.91334	0.000014	0.0446	60	67.690	0.89551	0.000016	0.0433
61	53.146	0.91110	0.000014	0.0439	61	68.641	0.89320	0.000017	0.0431
62	54.152	0.90882	0.000014	0.0437	62	69.586	0.89088	0.000017	0.0431
63	55.165	0.90653	0.000015	0.0435	63	70.523	0.88856	0.000017	0.0427
64	56.184	0.90423	0.000015	0.0429	64	71.455	0.88623	0.000018	0.0426
65	57.208	0.90190	0.000015	0.0426	65	72.380	0.88388	0.000018	0.0426
66	58.241	0.89955	0.000016	0.0420	66	73.299	0.88153	0.000019	0.0426
67	59.279	0.89717	0.000016	0.0410	67	74.211	0.87918	0.000019	0.0426
68	60.325	0.89477	0.000016	0.0408	68	75.117	0.87683	0.000019	0.0422
69	61.379	0.89232	0.000017	0.0407	69	76.016	0.87446	0.000020	0.0422
70	62.441	0.88986	0.000017	0.0103	70	76.909	0.87206	0.000020	0.0418

Alcoholometric Table—*Continued*

PERCENTAGE BY VOLUME					PERCENTAGE BY WEIGHT				
Per cent. vol.	Corresponding per cent. wt.	Sp. gr. app. in air $\frac{15.56^\circ}{15.56^\circ}$	Corr. of sp. gr. for barometer (100 mm.)	Fractional per cent.	Per cent. wt.	Corresponding per cent. vol.	Sp. gr. app. in air $\frac{15.56^\circ}{15.56^\circ}$	Corr. of sp. gr. for barometer (100 mm.)	Fractional per cent.
71	63.511	0.88738	0.000018	0.0395	71	77.794	0.86970	0.000021	0.0417
72	64.588	0.88485	0.000018	0.0392	72	78.672	0.86730	0.000021	0.0417
73	65.674	0.88230	0.000019	0.0389	73	79.544	0.86490	0.000021	0.0417
74	66.768	0.87973	0.000019	0.0385	74	80.410	0.86250	0.000022	0.0413
75	67.870	0.87713	0.000019	0.0380	75	81.269	0.86008	0.000022	0.0413
76	68.982	0.87450	0.000020	0.0376	76	82.121	0.85766	0.000022	0.0413
77	70.102	0.87184	0.000020	0.0370	77	82.967	0.85524	0.000023	0.0412
78	71.234	0.86914	0.000021	0.0365	78	83.805	0.85281	0.000023	0.0403
79	72.375	0.86640	0.000021	0.0362	79	84.636	0.85033	0.000024	0.0408
80	73.526	0.86364	0.000021	0.0357	80	85.459	0.84788	0.000024	0.0403
81	74.686	0.86084	0.000022	0.0352	81	86.275	0.84540	0.000024	0.0402
82	75.858	0.85800	0.000022	0.0350	82	87.083	0.84291	0.000025	0.0402
83	77.039	0.85514	0.000023	0.0344	83	87.885	0.84042	0.000025	0.0398
84	78.233	0.85223	0.000023	0.0337	84	88.678	0.83791	0.000025	0.0394
85	79.441	0.84926	0.000024	0.0331	85	89.464	0.83537	0.000026	0.0392
86	80.662	0.84624	0.000024	0.0326	86	90.240	0.83282	0.000026	0.0391
87	81.897	0.84317	0.000025	0.0322	87	91.008	0.83026	0.000027	0.0386
88	83.144	0.84006	0.000025	0.0314	88	91.766	0.82767	0.000027	0.0377
89	84.408	0.83688	0.000026	0.0307	89	92.517	0.82502	0.000028	0.0380
90	85.689	0.83362	0.000026	0.0300	90	93.254	0.82239	0.000028	0.0372
91	86.989	0.83029	0.000027	0.0291	91	93.982	0.81970	0.000028	0.0367
92	88.310	0.82685	0.000027	0.0282	92	94.700	0.81697	0.000029	0.0362
93	89.652	0.82330	0.000028	0.0272	93	95.407	0.81421	0.000029	0.0358
94	91.025	0.81963	0.000028	0.0262	94	96.103	0.81142	0.000030	0.0353
95	92.423	0.81581	0.000029	0.0252	95	96.787	0.80859	0.000030	0.0348
96	93.851	0.81184	0.000030	0.0240	96	97.457	0.80572	0.000030	0.0342
97	95.315	0.80769	0.000030	0.0229	97	98.117	0.80280	0.000031	0.0334
98	96.820	0.80333	0.000031	0.0214	98	98.759	0.79981	0.000031	0.0328
99	98.381	0.79865	0.000031	0.0200	99	99.386	0.79676	0.000032	0.0322
100	100.000	0.79365	0.000032		100	100.000	0.79365	0.000032	

Temperature Corrections

For volume per cent. of Alcohol by the foregoing Alcoholometric Table

Temp. C. 15.56°	Observed Per cent.—Alcohol by volume											
	1	2	3	4	5	6	7	8	9	10	12	14
	Subtract from observed Per cent. of Alcohol											
16	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.07	0.08
17	0.14	0.14	0.16	0.16	0.16	0.17	0.17	0.19	0.20	0.21	0.24	0.29
18	0.25	0.25	0.27	0.27	0.27	0.29	0.31	0.33	0.35	0.37	0.42	0.49
19	0.36	0.36	0.38	0.39	0.40	0.43	0.45	0.48	0.51	0.54	0.61	0.69
20	0.48	0.48	0.50	0.52	0.54	0.57	0.60	0.64	0.67	0.71	0.80	0.91
21	0.60	0.61	0.63	0.65	0.68	0.71	0.75	0.80	0.84	0.89	0.99	1.12
22	0.73	0.75	0.77	0.79	0.83	0.86	0.91	0.97	1.02	1.07	1.19	1.35
23	0.86	0.89	0.91	0.94	0.98	1.02	1.08	1.14	1.20	1.26	1.40	1.58
24	1.00	1.04	1.06	1.10	1.14	1.10	1.25	1.32	1.38	1.45	1.61	1.81
25		1.19	1.22	1.26	1.30	1.36	1.41	1.49	1.57	1.65	1.82	2.04
26		1.35	1.38	1.43	1.47	1.54	1.60	1.68	1.76	1.85	2.04	2.28
27		1.52	1.55	1.61	1.65	1.73	1.79	1.88	1.96	2.06	2.27	2.52
28		1.69	1.73	1.78	1.84	1.91	1.99	2.08	2.17	2.28	2.50	2.76
29		1.87	1.91	1.96	2.03	2.10	2.19	2.28	2.38	2.50	2.73	3.00
30			2.09	2.15	2.22	2.30	2.39	2.49	2.60	2.72	2.97	3.25
31			2.27	2.34	2.41	2.50	2.60	2.70	2.82	2.85	3.21	3.51
32			2.45	2.54	2.61	2.71	2.82	2.92	3.05	3.18	3.46	3.77
33			2.63	2.74	2.81	2.92	3.04	3.15	3.28	3.42	3.71	4.03
34			2.82	2.95	3.02	3.14	3.27	3.39	3.52	3.66	3.96	4.29
35				3.16	3.24	3.36	3.49	3.63	3.76	3.91	4.22	4.55

Temp. C. 15.56°	Observed Per cent.—Alcohol by volume											
	16	18	20	22	24	26	28	30	32	34	37	40
	Subtract from observed Per cent. of Alcohol											
16	0.10	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.19	0.19	0.18
17	0.33	0.38	0.42	0.46	0.50	0.54	0.57	0.59	0.60	0.60	0.59	0.58
18	0.56	0.65	0.73	0.79	0.84	0.89	0.95	0.99	1.00	1.01	1.00	0.98
19	0.80	0.91	1.02	1.11	1.19	1.27	1.33	1.39	1.40	1.41	1.41	1.39
20	1.04	1.18	1.32	1.44	1.54	1.64	1.72	1.79	1.81	1.82	1.81	1.79
21	1.28	1.45	1.61	1.76	1.88	2.00	2.10	2.18	2.21	2.22	2.22	2.19
22	1.53	1.73	1.91	2.07	2.21	2.35	2.47	2.57	2.60	2.63	2.63	2.59
23	1.78	2.00	2.21	2.39	2.55	2.71	2.84	2.95	3.00	3.03	3.03	3.00
24	2.04	2.28	2.51	2.71	2.88	3.06	3.21	3.34	3.40	3.44	3.44	3.40
25	2.29	2.56	2.81	3.03	3.22	3.41	3.58	3.73	3.80	3.84	3.85	3.80
26	2.55	2.83	3.11	3.35	3.56	3.77	3.95	4.11	4.20	4.25	4.26	4.21
27	2.80	3.11	3.41	3.68	3.91	4.13	4.32	4.50	4.59	4.65	4.67	4.62
28	3.06	3.38	3.71	4.00	4.25	4.49	4.70	4.88	4.99	5.05	5.07	5.02
29	3.32	3.66	4.01	4.33	4.60	4.85	5.06	5.26	5.38	5.46	5.48	5.43
30	3.58	3.94	4.31	4.65	4.94	5.21	5.43	5.64	5.77	5.86	5.89	5.84
31	3.85	4.22	4.61	4.97	5.28	5.56	5.70	6.01	6.16	6.26	6.29	6.24
32	4.12	4.51	4.92	5.30	5.62	5.91	6.16	6.39	6.54	6.65	6.70	6.65
33	4.40	4.80	5.22	5.62	5.95	6.26	6.50	6.76	6.92	7.04	7.10	7.05
34	4.67	5.09	5.54	5.94	6.29	6.62	6.90	7.13	7.30	7.44	7.51	7.46
35	4.94	5.39	5.86	6.27	6.63	6.97	7.26	7.50	7.67	7.83	7.91	7.86

Temperature Corrections—*Continued*

For volume per cent. of Alcohol by the foregoing Alcoholometric Table

Temp. C. 15.56°	Observed Per cent.—Alcohol by volume											
	43	46	49	52	55	58	61	64	67	70	73	76
	Subtract from observed Per cent. of Alcohol											
16	0.18	0.18	0.17	0.17	0.16	0.16	0.16	0.16	0.16	0.15	0.15	0.14
17	0.57	0.56	0.55	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45
18	0.97	0.95	0.93	0.90	0.88	0.86	0.85	0.83	0.82	0.80	0.79	0.76
19	1.37	1.34	1.30	1.27	1.25	1.22	1.19	1.17	1.14	1.12	1.11	1.08
20	1.76	1.72	1.68	1.64	1.61	1.57	1.54	1.51	1.48	1.45	1.42	1.39
21	2.15	2.11	2.06	2.02	1.98	1.94	1.90	1.85	1.82	1.79	1.75	1.70
22	2.55	2.50	2.44	2.39	2.34	2.29	2.24	2.20	2.16	2.12	2.07	2.02
23	2.94	2.89	2.82	2.76	2.71	2.66	2.60	2.55	2.50	2.46	2.39	2.33
24	3.34	3.28	3.21	3.14	3.07	3.01	2.95	2.90	2.84	2.79	2.72	2.65
25	3.74	3.67	3.60	3.52	3.44	3.37	3.31	3.24	3.18	3.13	3.05	2.97
26	4.14	4.07	3.98	3.89	3.81	3.74	3.67	3.59	3.33	3.47	3.38	3.29
27	4.55	4.47	4.37	4.27	4.18	4.10	4.02	3.95	3.87	3.80	3.71	3.62
28	4.95	4.86	4.76	4.65	4.56	4.48	4.39	4.31	4.22	4.14	4.04	3.95
29	5.35	5.26	5.15	5.04	4.93	4.84	4.75	4.66	4.57	4.48	4.38	4.27
30	5.75	5.66	5.53	5.41	5.30	5.20	5.11	5.01	4.91	4.82	4.71	4.59
31	6.15	6.06	5.92	5.79	5.67	5.57	5.48	5.37	5.27	5.17	5.05	4.93
32	6.56	6.46	6.32	6.19	6.05	5.95	5.84	5.73	5.62	5.51	5.39	5.26
33	6.96	6.85	6.72	6.57	6.43	6.32	6.20	6.09	5.97	5.86	5.73	5.59
34	7.36	7.25	7.12	6.96	6.81	6.69	6.56	6.44	6.32	6.21	6.07	5.92
35	7.76	7.65	7.51	7.35	7.19	7.06	6.93	6.80	6.68	6.56	6.41	6.25

Temp. C. 15.56°	Observed Per cent.—Alcohol by volume										
	79	82	84	86	88	90	92	94	96	98	100
	Subtract from observed Per cent. of Alcohol										
16	0.13	0.13	0.13	0.13	0.12	0.12	0.11	0.10	0.10	0.09	0.08
17	0.44	0.42	0.41	0.41	0.39	0.38	0.36	0.33	0.31	0.27	0.24
18	0.74	0.71	0.70	0.69	0.66	0.63	0.60	0.56	0.52	0.46	0.40
19	1.04	1.00	0.98	0.96	0.93	0.89	0.85	0.79	0.73	0.65	0.57
20	1.34	1.30	1.28	1.24	1.20	1.15	1.09	1.02	0.94	0.85	0.74
21	1.66	1.60	1.57	1.53	1.47	1.42	1.34	1.26	1.16	1.05	0.92
22	1.97	1.90	1.86	1.82	1.75	1.69	1.60	1.50	1.39	1.26	1.09
23	2.27	2.20	2.15	2.10	2.03	1.96	1.86	1.75	1.61	1.46	1.27
24	2.58	2.50	2.45	2.39	2.31	2.23	2.12	1.99	1.84	1.67	1.45
25	2.89	2.81	2.75	2.68	2.60	2.50	2.38	2.23	2.07	1.88	1.63
26	3.21	3.11	3.05	2.96	2.89	2.78	2.64	2.48	2.31	2.10	1.82
27	3.52	3.42	3.35	3.27	3.17	3.05	2.91	2.74	2.54	2.31	2.00
28	3.84	3.73	3.65	3.51	3.46	3.33	3.18	2.99	2.78	2.53	2.19
29	4.16	4.04	3.96	3.86	3.74	3.61	3.45	3.25	3.02	2.75	2.38
30	4.47	4.34	4.26	4.16	4.03	3.89	3.72	3.51	3.26	2.98	2.58
31	4.79	4.66	4.56	4.46	4.32	4.18	3.99	3.77	3.51	3.21	2.78
32	5.12	4.98	4.88	4.77	4.62	4.46	4.27	4.03	3.76	3.45	2.99
33	5.45	5.30	5.19	5.07	4.92	4.75	4.54	4.30	4.01	3.68	3.19
34	5.77	5.62	5.51	5.38	5.22	5.03	4.82	4.56	4.26	3.92	3.40
35	6.09	5.94	5.82	5.69	5.52	5.32	5.09	4.82	4.52	4.15	3.61

Acid and Alkali Tables

Specific Gravity.—By specific gravity, in the tables which follow, is meant the weight (in air with brass weights, barometer at 760 mm.) of a volume of the fluid equal to the same volume of the *unit* (1.0000) of pure water at the same temperature. Figures are given both for 25° C., the official standard temperature, and for 15° C. One-half the sum of these figures may be taken as a close approximation to the specific gravity at 20° C., the standard temperature adopted by the U. S. Bureau of Standards. The temperature corrections given assume that glass apparatus is used, the coefficient of cubical expansion of glass being taken as 0.000025.

Percentage.—To determine the percentage strength of an acid or alkali by its specific gravity, take the apparent specific gravity at the room temperature with a pycnometer, hydrometer, or Mohr-Westphal balance. Correct to the standard temperature by the figures in column 4, and ascertain the per cent. of acid or alkali from columns 2 (or 3) and 5 in the following manner:

Example: A sample of dilute sulphuric acid (see page 646) has an apparent specific gravity at 21° C. (room temperature), by a pycnometer standardized at 25° C., of 1.1457. The correction for 4° C. (subtractive) is $0.000561 \times 4 = 0.0022$ (from column 4). The corrected specific gravity, $1.1457 - 0.0022 = 1.1435$. The nearest lower figure in column 2 is 1.1400, showing (column 1) 20 per cent. of acid. For the fractional per cent., multiply the difference ($1.1435 - 1.1400 = 0.0035$, taken as 35) by 0.0132 (column 5); the product is 0.462. The strength is therefore 20.462 per cent.

Normality.—Column 6 shows the "normality,"—*i.e.*, the neutralizing power of the acid or alkali. If the figure in this column is 2.74, one volume of the acid diluted with water to make 2.74 volumes will be of "normal" strength. It is therefore easy by the aid of these figures to prepare volumetric solutions of approximately any desired strength ($\frac{N}{1}$, $\frac{N}{10}$, $\frac{N}{40}$, etc.) from an acid or alkali of known percentage strength. For accurate work such solutions must of course be standardized by the usual methods. (See Volumetric Solutions, page 555).

The chief use, however, of the normality column is for the determination directly by titration of the percentage strength of an acid or alkali of unknown specific gravity.

Example: 1 mil (accurately measured) of a sample of acetic acid of unknown strength is found to require for neutralization 4.62 mils of normal potassium hydroxide V.S. The nearest lower figure in column 6 is 4.465, corresponding with 26 per cent. For the fractional per cent., multiply the difference ($4.620 - 4.465 = 0.155$, taken as 15.5) by 0.0565 (column 7). The product is 0.8757. The strength is therefore 26.87 + per cent.

Acetic Acid

Per cent. $HC_2H_3O_2$	Sp. gr. app. 25° C./25° C.	Sp. gr. app. 15° C./15° C.	Correction of specific gravity for 1° C.*	Fractional per cent.†	Normality. 1 mil requires normal KOH mils.	Per cent. = 0.01 mil normal KOH.
‡0	1.0000	1.0000	0.00018	0.0714	0.000	0.0599
1	1.0014	1.0015	0.00019	0.0714	0.167	0.0602
2	1.0028	1.0030	0.00020	0.0714	0.333	0.0595
3	1.0042	1.0045	0.00022	0.0714	0.501	0.0599
4	1.0056	1.0060	0.00023	0.0714	0.668	0.0595
5	1.0070	1.0075	0.00024	0.0769	0.836	0.0592
6	1.0083	1.0090	0.00025	0.0714	1.005	0.0592
7	1.0097	1.0105	0.00026	0.0714	1.174	0.0588
8	1.0111	1.0120	0.00028	0.0769	1.344	0.0588
9	1.0124	1.0135	0.00029	0.0714	1.514	0.0588
10	1.0138	1.0150	0.00030	0.0769	1.684	0.0585
11	1.0151	1.0165	0.00031	0.0714	1.855	0.0585
12	1.0165	1.0179	0.00033	0.0769	2.026	0.0581
13	1.0178	1.0193	0.00034	0.0769	2.198	0.0581
14	1.0191	1.0208	0.00036	0.0769	2.370	0.0581
15	1.0204	1.0222	0.00037	0.0769	2.542	0.0578
16	1.0217	1.0236	0.00038	0.0833	2.715	0.0578
17	1.0229	1.0251	0.00040	0.0769	2.888	0.0575
18	1.0242	1.0265	0.00041	0.0833	3.062	0.0575
19	1.0254	1.0279	0.00043	0.0833	3.236	0.0571
20	1.0266	1.0293	0.00044	0.0769	3.411	0.0571
21	1.0279	1.0307	0.00045	0.0833	3.586	0.0571
22	1.0291	1.0320	0.00046	0.0833	3.761	0.0571
23	1.0303	1.0333	0.00048	0.0833	3.936	0.0568
24	1.0315	1.0346	0.00049	0.0833	4.112	0.0568
25	1.0327	1.0359	0.00050	0.0909	4.288	0.0565
26	1.0338	1.0372	0.00051	0.0833	4.465	0.0565
27	1.0350	1.0384	0.00053	0.0909	4.642	0.0565
28	1.0361	1.0397	0.00054	0.0909	4.819	0.0565
29	1.0372	1.0409	0.00055	0.0909	4.996	0.0562
30	1.0383	1.0421	0.00056	0.0909	5.174	0.0562
31	1.0394	1.0433	0.00057	0.1000	5.352	0.0562
32	1.0404	1.0445	0.00059	0.0909	5.530	0.0559
33	1.0415	1.0456	0.00060	0.1000	5.709	0.0559
34	1.0425	1.0468	0.00062	0.1000	5.888	0.0559
35	1.0435	1.0479	0.00063	0.1000	6.067	0.0559
36	1.0445	1.0490	0.00064	0.1000	6.246	0.0559
37	1.0455	1.0501	0.00065	0.1111	6.425	0.0559
38	1.0464	1.0511	0.00066	0.1000	6.604	0.0556
39	1.0474	1.0522	0.00067	0.1111	6.784	0.0556
40	1.0483	1.0532	0.00068	0.1111	6.964	0.0556

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* Add if the temperature is above, subtract if it is below the standard.

† Corresponding with a difference in specific gravity of 0.0001.

‡ The figures on this line across the page are for fractional percentages below 1.

Acetic Acid—*Continued*

Per cent. $HC_2H_3O_2$	Sp. gr. app. $\frac{25° C.}{25° C.}$	Sp. gr. app. $\frac{15° C.}{15° C.}$	Correction of specific gravity for 1° C.	Fractional per cent	Normality. 1 mil requires normal KOH mils.	Per cent. = 0.01 mil normal KOH.
41	1.0492	1.0542	0.00069	0.1111	7.144	0.0552
42	1.0501	1.0552	0.00070	0.1111	7.325	0.0552
43	1.0510	1.0561	0.00070	0.1250	7.506	0.0552
44	1.0518	1.0571	0.00071	0.1111	7.687	0.0552
45	1.0527	1.0580	0.00072	0.1250	7.868	0.0549
46	1.0535	1.0589	0.00073	0.1250	8.050	0.0552
47	1.0543	1.0598	0.00074	0.1250	8.231	0.0552
48	1.0551	1.0607	0.00075	0.1429	8.412	0.0552
49	1.0558	1.0616	0.00076	0.1250	8.593	0.0549
50	1.0566	1.0624	0.00077	0.1429	8.775	0.0552
51	1.0573	1.0632	0.00077	0.1429	8.956	0.0549
52	1.0580	1.0640	0.00078	0.1429	9.138	0.0552
53	1.0587	1.0647	0.00079	0.1667	9.319	0.0549
54	1.0593	1.0655	0.00079	0.1429	9.501	0.0549
55	1.0600	1.0662	0.00080	0.1667	9.683	0.0549
56	1.0606	1.0669	0.00081	0.1667	9.865	0.0549
57	1.0612	1.0675	0.00081	0.1667	10.047	0.0549
58	1.0618	1.0682	0.00082	0.1667	10.229	0.0549
59	1.0624	1.0688	0.00083	0.2000	10.411	0.0549
60	1.0629	1.0694	0.00084	0.2000	10.593	0.0549
61	1.0634	1.0700	0.00084	0.2000	10.775	0.0549
62	1.0639	1.0706	0.00085	0.2000	10.957	0.0552
63	1.0644	1.0711	0.00086	0.2500	11.138	0.0549
64	1.0648	1.0716	0.00086	0.2500	11.320	0.0552
65	1.0652	1.0721	0.00087	0.2500	11.501	0.0552
66	1.0656	1.0726	0.00087	0.2500	11.682	0.0549
67	1.0660	1.0730	0.00088	0.2500	11.864	0.0552
68	1.0664	1.0734	0.00089	0.2500	12.045	0.0552
69	1.0668	1.0738	0.00089	0.3333	12.226	0.0552
70	1.0671	1.0742	0.00090	0.3333	12.407	0.0556
71	1.0674	1.0746	0.00090	0.5000	12.587	0.0556
72	1.0676	1.0749	0.00091	0.5000	12.767	0.0559
73	1.0678	1.0751	0.00092	1.0000	12.946	0.0559
74	1.0679	1.0753	0.00092	1.0000	13.125	0.0559
75	1.0680	1.0755	0.00093	1.0000	13.304	0.0562
76	1.0681	1.0756	0.00093	......	13.482	0.0562
77	1.0681	1.0757	0.00094	......	13.660	0.0562
78	1.0681	1.0757	0.00094	......	13.838	0.0565
79	1.0681*	1.0757	0.00095	1.0000	14.015	0.0565
80	1.0680	1.0757	0.00096	0.5000	14.192	0.0571

*Below this point the specific gravity diminishes as the strength of the acid increases.

Acetic Acid—*Continued*

Per cent. $HC_2H_3O_2$	Sp. gr. app. 25° C./25° C.	Sp. gr. app. 15° C./15° C.	Correction of specific gravity for 1° C.	Fractional per cent.	Normality. 1 mil requires normal KOH mils.	Per cent. = 0.01 mil normal KOH.
81	1.0678	1.0756	0.00096	0.5000	14.367	0.0571
82	1.0676	1.0755	0.00097	0.5000	14.542	0.0575
83	1.0674	1.0753	0.00097	0.3333	14.716	0.0578
84	1.0671	1.0751	0.00098	0.2500	14.889	0.0581
85	1.0667	1.0748	0.00099	0.2500	15.061	0.0585
86	1.0663	1.0745	0.00099	0.2000	15.232	0.0592
87	1.0658	1.0740	0.00100	0.1667	15.401	0.0592
88	1.0652	1.0735	0.00101	0.1667	15.570	0.0599
89	1.0646	1.0729	0.00102	0.1250	15.737	0.0602
90	1.0638	1.0722	0.00103	0.1111	15.903	0.0610
91	1.0629	1.0714	0.00103	0.1111	16.067	0.0617
92	1.0620	1.0705	0.00103	0.0833	16.229	0.0629
93	1.0608	1.0695	0.00104	0.0833	16.388	0.0637
94	1.0596	1.0683	0.00104	0.0714	16.545	0.0654
95	1.0582	1.0669	0.00105	0.0588	16.698	0.0676
96	1.0565	1.0653	0.00106	0.0526	16.846	0.0694
97	1.0546	1.0634	0.00106	0.0455	16.990	0.0709
98	1.0524	1.0613	0.00107	0.0400	17.131	0.0746
99	1.0499	1.0589	0.00108	0.0357	17.265	0.0781
100	1.0471	1.0562	0.00109	......	17.393	......

NOTE: If the specific gravity of the acid is greater than 1.045, mix some of the acid with an equal weight of water and take the specific gravity of the mixture, then multiply the corresponding percentage taken from the table by two. It is better, however, to determine the strength of any sample of acetic acid by its normality.

To find the volume per cent. of official Acetic Acid (36 per cent.) multiply the "normality" by 16.01. For the volume per cent. of Acetic Acid ($HC_2H_3O_2$), multiply the "normality" by 5.751. For the volume per cent. of official Diluted Acetic Acid (6 per cent.), multiply the "normality" by 99.5.

Hydrochloric Acid

Per cent. HCl	Sp. gr. app. 25° C./25° C.	Sp. gr. app. 15° C./15° C.	Correction of specific gravity for 1° C.*	Fractional per cent.†	Normality. 1 mil requires normal KOH mils.	Per cent = 0.01 mil normal KOH.
‡0	1.0000	1.0000	0.00018	0.0203	0.000	0.0362
1	1.0049	1.0050	0.00018	0.0204	0.276	0.0360
2	1.0098	1.0099	0.00019	0.0204	0.554	0.0357
3	1.0147	1.0149	0.00020	0.0205	0.834	0.0355
4	1.0196	1.0198	0.00020	0.0206	1.116	0.0352
5	1.0245	1.0247	0.00021	0.0207	1.400	0.0345
6	1.0293	1.0296	0.00022	0.0207	1.690	0.0344
7	1.0341	1.0346	0.00023	0.0208	1.981	0.0341
8	1.0389	1.0395	0.00024	0.0209	2.274	0.0339
9	1.0437	1.0444	0.00025	0.0210	2.569	0.0336
10	1.0485	1.0493	0.00027	0.0210	2.867	0.0332
11	1.0532	1.0542	0.00029	0.0211	3.168	0.0329
12	1.0580	1.0591	0.00030	0.0211	3.472	0.0327
13	1.0627	1.0640	0.00032	0.0212	3.778	0.0325
14	1.0674	1.0689	0.00034	0.0211	4.086	0.0322
15	1.0722	1.0738	0.00036	0.0211	4.397	0.0318
16	1.0769	1.0788	0.00038	0.0210	4.711	0.0316
17	1.0817	1.0837	0.00039	0.0209	5.027	0.0313
18	1.0865	1.0886	0.00041	0.0209	5.346	0.0311
19	1.0912	1.0936	0.00043	0.0209	5.668	0.0308
20	1.0960	1.0986	0.00045	0.0207	5.993	0.0306
21	1.1009	1.1036	0.00047	0.0205	6.320	0.0303
22	1.1057	1.1086	0.00049	0.0203	6.650	0.0300
23	1.1107	1.1137	0.00051	0.0202	6.983	0.0298
24	1.1156	1.1189	0.00053	0.0200	7.319	0.0295
25	1.1206	1.1241	0.00055	0.0201	7.658	0.0292
26	1.1256	1.1293	0.00057	0.0202	8.000	0.0290
27	1.1305	1.1344	0.00059	0.0203	8.345	0.0288
28	1.1355	1.1395	0.00061	0.0203	8.692	0.0287
29	1.1404	1.1446	0.00062	0.0203	9.041	0.0284
30	1.1453	1.1497	0.00064	0.0202	9.393	0.0281
31	1.1503	1.1548	0.00066	0.0203	9.749	0.0280
32	1.1532	1.1599	0.00068	0.0203	10.106	0.0278
33	1.1601	1.1650	0.00069	0.0203	10.466	0.0275
34	1.1651	1.1700	0.00070	0.0203	10.829	0.0274
35	1.1700	1.1751	0.00072	0.0209	11.194	0.0272
36	1.1748	1.1800	0.00073	0.0212	11.561	0.0271
37	1.1795	1.1848	0.00074	0.0216	11.930	0.0270
38	1.1841	1.1895	0.00075	0.0220	12.301	0.0267
39	1.1886	1.1941	0.00076	0.0221	12.675	0.0266
40	1.1931	1.1986	0.00077	......	13.051	......

* Add if the temperature is above, subtract if it is below, the standard.

† Corresponding with a difference in specific gravity of 0.0001.

‡ The figures on this line across the page are for fractional percentages below 1.

NOTE: To find the per cent. of chlorine, multiply the per cent. of Hydrochloric Acid by 0.9724.

For the volume per cent. of official Hydrochloric Acid (32 per cent.), multiply the "normality" by 9.895. For the volume per cent. of official Diluted Hydrochloric Acid (10 per cent.), multiply the "normality" by 34.88.

Nitric Acid

Per cent. HNO_3	Sp. gr. app. 25° C. / 25° C.	Sp. gr. app. 15° C. / 15° C.	Correction of specific gravity for 1° C.*	Fractional per cent.†	Normality. 1 mil requires normal KOH mils.	Per cent. = 0.01 mil normal KOH.
‡0	1.0000	1.0000	0.000180	0.0182	0.000	0.0629
1	1.0055	1.0056	0.000191	0.0185	0.159	0.0621
2	1.0109	1.0111	0.000201	0.0185	0.320	0.0617
3	1.0163	1.0165	0.000210	0.0185	0.482	0.0606
4	1.0217	1.0221	0.000215	0.0182	0.647	0.0602
5	1.0272	1.0277	0.000228	0.0182	0.813	0.0595
6	1.0327	1.0334	0.000255	0.0179	0.981	0.0588
7	1.0383	1.0392	0.000278	0.0175	1.151	0.0585
8	1.0440	1.0451	0.000299	0.0175	1.322	0.0575
9	1.0497	1.0510	0.000319	0.0172	1.496	0.0568
10	1.0555	1.0570	0.000335	0.0172	1.672	0.0568
11	1.0613	1.0630	0.000355	0.0169	1.848	0.0559
12	1.0672	1.0690	0.000374	0.0169	2.027	0.0556
13	1.0731	1.0751	0.000393	0.0169	2.207	0.0546
14	1.0790	1.0812	0.000415	0.0167	2.390	0.0543
15	1.0850	1.0874	0.000436	0.0167	2.574	0.0532
16	1.0910	1.0937	0.000455	0.0161	2.762	0.0529
17	1.0972	1.1000	0.000474	0.0161	2.951	0.0524
18	1.1034	1.1064	0.000492	0.0159	3.142	0.0518
19	1.1097	1.1128	0.000512	0.0161	3.335	0.0510
20	1.1159	1.1192	0.000530	0.0161	3.531	0.0508
21	1.1221	1.1256	0.000550	0.0159	3.728	0.0503
22	1.1284	1.1321	0.000569	0.0161	3.927	0.0495
23	1.1346	1.1385	0.000588	0.0159	4.129	0.0493
24	1.1409	1.1449	0.000604	0.0156	4.332	0.0488
25	1.1473	1.1514	0.000618	0.0156	4.537	0.0478
26	1.1537	1.1580	0.000635	0.0154	4.746	0.0476
27	1.1602	1.1647	0.000651	0.0156	4.956	0.0472
28	1.1668	1.1714	0.000666	0.0154	5.168	0.0465
29	1.1734	1.1781	0.000682	0.0154	5.383	0.0461
30	1.1800	1.1848	0.000696	0.0154	5.600	0.0459
31	1.1866	1.1916	0.000714	0.0149	5.818	0.0450
32	1.1933	1.1985	0.000727	0.0147	6.040	0.0448
33	1.2001	1.2054	0.000742	0.0149	6.263	0.0441
34	1.2068	1.2123	0.000763	0.0147	6.490	0.0439
35	1.2135	1.2191	0.000786	0.0152	6.718	0.0435
36	1.2201	1.2260	0.000810	0.0152	6.948	0.0431
37	1.2267	1.2329	0.000830	0.0149	7.180	0.0427
38	1.2334	1.2397	0.000849	0.0152	7.414	0.0424
39	1.2400	1.2464	0.000865	0.0152	7.650	0.0420
40	1.2466	1.2531	0.000879	0.0154	7.888	0.0418

* Add if the temperature is above, subtract if it is below, the standard.

† Corresponding with a difference in specific gravity of 0.0001.

‡ The figures on this line across the page are for fractional percentages below 1.

Nitric Acid—*Continued*

Per cent. HNO_3	Sp. gr. app. $\frac{25° C.}{25° C.}$	Sp. gr. app. $\frac{15° C.}{15° C.}$	Correction of specific gravity for 1° C.	Fractional per cent.	Normality. 1 mil requires normal KOH mils.	Per cent. = 0.01 mil normal KOH.
41	1.2531	1.2598	0.000895	0.0154	8.127	0.0415
42	1.2596	1.2665	0.000915	0.0156	8.368	0.0412
43	1.2660	1.2731	0.000932	0.0156	8.611	0.0408
44	1.2724	1.2797	0.000952	0.0156	8.856	0.0405
45	1.2788	1.2862	0.000973	0.0159	9.103	0.0403
46	1.2851	1.2927	0.000992	0.0161	9.351	0.0402
47	1.2913	1.2991	0.001011	0.0161	9.600	0.0397
48	1.2975	1.3055	0.001032	0.0161	9.852	0.0395
49	1.3037	1.3119	0.001053	0.0164	10.105	0.0394
50	1.3098	1.3182	0.001076	0.0169	10.359	0.0392
51	1.3157	1.3243	0.001085	0.0169	10.614	0.0389
52	1.3216	1.3304	0.001115	0.0175	10.871	0.0389
53	1.3273	1.3363	0.001134	0.0179	11.128	0.0389
54	1.3329	1.3421	0.001154	0.0182	11.385	0.0389
55	1.3384	1.3477	0.001173	0.0185	11.643	0.0386
56	1.3438	1.3533	0.001191	0.0192	11.902	0.0385
57	1.3490	1.3587	0.001211	0.0196	12.162	0.0385
58	1.3541	1.3640	0.001229	0.0200	12.422	0.0383
59	1.3591	1.3692	0.001250	0.0204	12.683	0.0383
60	1.3640	1.3742	0.001269	0.0208	12.944	0.0383
61	1.3688	1.3792	0.001287	0.0213	13.205	0.0382
62	1.3735	1.3841	0.001305	0.0213	13.467	0.0377
63	1.3782	1.3890	0.001321	0.0213	13.732	0.0376
64	1.3829	1.3938	0.001338	0.0213	13.998	0.0373
65	1.3876	1.3987	0.001352	0.0208	14.266	0.0372
66	1.3924	1.4035	0.001365	0.0213	14.535	0.0369
67	1.3971	1.4083	0.001372	0.0213	14.806	0.0369
68	1.4018	1.4131	0.001382	0.0213	15.077	0.0366
69	1.4065	1.4179	0.001389	0.0213	15.350	0.0365
70	1.4112	1.4226	0.001397	0.0213	15.624	0.0362
71	1.4159	1.4273	0.001404	0.0217	15.900	0.0361
72	1.4205	1.4320	0.001412	0.0222	16.177	0.0360
73	1.4250	1.4366	0.001419	0.0227	16.455	0.0361
74	1.4294	1.4411	0.001427	0.0233	16.732	0.0365
75	1.4336	1.4454	0.001439	0.0278	17.006	0.0372
76	1.4372	1.4491	0.001442	0.0286	17.275	0.0372
77	1.4407	1.4527	0.001454	0.0303	17.544	0.0373
78	1.4440	1.4561	0.001469	0.0323	17.812	0.0372
79	1.4471	1.4595	0.001491	0.0333	18.081	0.0373
80	1.4501	1.4627	0.001515	0.0333	18.349	0.0372
81	1.4531	1.4659	0.001542	0.0333	18.618	0.0373
82	1.4561	1.4691	0.001564	0.0345	18.886	0.0372
83	1.4590	1.4721	0.001577	0.0345	19.155	0.0372
84	1.4619	1.4751	0.001583	0.0345	19.424	0.0372
85	1.4648	1.4780	0.001580	0.0345	19.693	0.0369

Nitric Acid—*Continued*

Per cent. HNO_3	Sp. gr. app. $\frac{25° C.}{25° C.}$	Sp. gr. app. $\frac{15° C.}{15° C.}$	Correction of specific gravity for 1° C.	Fractional per cent.	Normality. 1 mil requires normal KOH mils.	Per cent. = 0.01 mil normal KOH.
86	1.4677	1.4809	0.001578	0.0333	19.964	0.0366
87	1.4707	1.4838	0.001573	0.0345	20.237	0.0362
88	1.4736	1.4867	0.001569	0.0345	20.513	0.0364
89	1.4765	1.4895	0.001562	0.0333	20.788	0.0368
90	1.4795	1.4924	0.001553	0.0400	21.060	0.0377
91	1.4819	1.4949	0.001564	0.0435	21.325	0.0377
92	1.4842	1.4973	0.001575	0.0500	21.590	0.0377
93	1.4862	1.4994	0.001586	0.0526	21.855	0.0377
94	1.4881	1.5015	0.001597	0.0556	22.120	0.0377
95	1.4899	1.5033	0.001608	0.0588	22.385	0.0350
96	1.4916	1.5053	0.001631	0.0357	22.671	0.0344
97	1.4944	1.5083	0.001658	0.0270	22.962	0.0340
98	1.4981	1.5123	0.001683	0.0217	23.256	0.0336
99	1.5027	1.5171	0.001708	0.0175	23.554	0.0330
100	1.5084	1.5230	0.001732	......	23.857	......

NOTE: To find the per cent. of N_2O_5, multiply the per cent. of HNO_3 by 0.85703. To find the per cent. of NO_3, multiply the per cent. of HNO_3 by 0.98397. To find the volume per cent. of official Nitric Acid (68 per cent.), multiply the "normality" by 6.633. For the volume per cent. of official Diluted Nitric Acid (10 per cent.), multiply the "normality" by 59.81.

Sulphuric Acid

Per cent. H_2SO_4	Sp. gr. app. $\frac{25° C.}{25° C.}$	Sp. gr. app. $\frac{15° C.}{15° C.}$	Correction of specific gravity for 1° C.*	Fractional per cent.†	Normality. 1 mil requires normal KOH mils	Per cent. = 0.01 mil normal KOH.
‡0	1.0000	1.0000	0.000180	0.0147	0.000	0.0488
1	1.0068	1.0070	0.000200	0.0152	0.205	0.0483
2	1.0134	1.0139	0.000221	0.0154	0.412	0.0476
3	1.0199	1.0206	0.000241	0.0152	0.622	0.0469
4	1.0265	1.0274	0.000262	0.0152	0.835	0.0465
5	1.0331	1.0342	0.000282	0.0149	1.050	0.0459
6	1.0398	1.0411	0.000302	0.0147	1.268	0.0452
7	1.0466	1.0480	0.000323	0.0147	1.489	0.0446
8	1.0534	1.0550	0.000343	0.0145	1.713	0.0441
9	1.0603	1.0621	0.000363	0.0145	1.940	0.0437
10	1.0672	1.0692	0.000384	0.0143	2.169	0.0429
11	1.0742	1.0764	0.000404	0.0143	2.402	0.0424
12	1.0812	1.0836	0.000424	0.0139	2.638	0.0420
13	1.0884	1.0909	0.000444	0.0141	2.876	0.0413
14	1.0955	1.0983	0.000464	0.0139	3.118	0.0410
15	1.1027	1.1057	0.000484	0.0135	3.362	0.0403
16	1.1101	1.1132	0.000500	0.0135	3.610	0.0398
17	1.1175	1.1207	0.000516	0.0135	3.861	0.0392
18	1.1249	1.1283	0.000531	0.0133	4.116	0.0388
19	1.1324	1.1360	0.000546	0.0132	4.374	0.0385
20	1.1400	1.1437	0.000561	0.0132	4.634	0.0377
21	1.1476	1.1515	0.000574	0.0130	4.898	0.0375
22	1.1553	1.1593	0.000586	0.0128	5.166	0.0368
23	1.1631	1.1671	0.000599	0.0128	5.438	0.0365
24	1.1709	1.1750	0.000611	0.0128	5.712	0.0360
25	1.1787	1.1830	0.000623	0.0127	5.990	0.0356
26	1.1866	1.1910	0.000633	0.0127	6.271	0.0351
27	1.1946	1.1991	0.000642	0.0125	6.556	0.0347
28	1.2026	1.2072	0.000651	0.0123	6.844	0.0342
29	1.2107	1.2153	0.000661	0.0123	7.136	0.0338
30	1.2188	1.2235	0.000670	0.0122	7.432	0.0334
31	1.2270	1.2318	0.000676	0.0122	7.731	0.0330
32	1.2352	1.2401	0.000682	0.0120	8.034	0.0327
33	1.2435	1.2484	0.000688	0.0119	8.340	0.0322
34	1.2519	1.2568	0.000694	0.0119	8.651	0.0318
35	1.2603	1.2653	0.000699	0.0118	8.965	0.0314
36	1.2688	1.2738	0.000702	0.0118	9.283	0.0311
37	1.2773	1.2823	0.000704	0.0116	9.605	0.0307
38	1.2859	1.2909	0.000707	0.0116	9.931	0.0303
39	1.2945	1.2996	0.000709	0.0115	10.261	0.0299
40	1.3032	1.3083	0.000712	0.0114	10.595	0.0296

* Add if the temperature is above, subtract if it is below, the standard.

† Corresponding with a difference in specific gravity of 0.0001.

‡ The figures in this line across the page are for fractional percentages below 1.

Suphuric Acid—*Continued*

Per cent. H_2SO_4	Sp. gr. app. $\frac{25^\circ \text{ C.}}{25^\circ \text{ C.}}$	Sp. gr. app. $\frac{15^\circ \text{ C.}}{15^\circ \text{ C.}}$	Correction of specific gravity for 1° C.	Fractional per cent.	Normality. 1 mil requires normal KOH mils.	Per cent. = 0.01 mil normal KOH.
41	1.3120	1.3171	0.000715	0.0112	10.933	0.0292
42	1.3209	1.3260	0.000717	0.0111	11.276	0.0288
43	1.3299	1.3350	0.000720	0.0110	11.623	0.0285
44	1.3390	1.3441	0.000723	0.0110	11.974	0.0281
45	1.3481	1.3533	0.000726	0.0108	12.330	0.0278
46	1.3574	1.3626	0.000731	0.0108	12.690	0.0273
47	1.3667	1.3721	0.000736	0.0105	13.056	0.0270
48	1.3762	1.3816	0.000741	0.0103	13.426	0.0266
49	1.3859	1.3913	0.000747	0.0103	13.802	0.0263
50	1.3956	1.4011	0.000753	0.0102	14.182	0.0260
51	1.4054	1.4110	0.000759	0.0100	14.567	0.0256
52	1.4154	1.4210	0.000765	0.0100	14.958	0.0253
53	1.4254	1.4311	0.000771	0.0098	15.354	0.0249
54	1.4356	1.4413	0.000777	0.0097	15.755	0.0246
55	1.4459	1.4516	0.000784	0.0096	16.162	0.0243
56	1.4563	1.4621	0.000790	0.0095	16.574	0.0239
57	1.4668	1.4726	0.000795	0.0094	16.992	0.0236
58	1.4774	1.4832	0.000800	0.0093	17.415	0.0234
59	1.4881	1.4939	0.000805	0.0093	17.843	0.0230
60	1.4989	1.5048	0.000810	0.0092	18.277	0.0228
61	1.5098	1.5157	0.000816	0.0091	18.716	0.0225
62	1.5208	1.5267	0.000822	0.0091	19.161	0.0222
63	1.5318	1.5379	0.000828	0.0090	19.612	0.0219
64	1.5429	1.5491	0.000834	0.0089	20.068	0.0217
65	1.5541	1.5603	0.000841	0.0088	20.529	0.0214
66	1.5654	1.5717	0.000848	0.0088	20.996	0.0211
67	1.5768	1.5831	0.000856	0.0088	21.469	0.0209
68	1.5882	1.5946	0.000864	0.0087	21.947	0.0207
69	1.5997	1.6062	0.000872	0.0087	22.431	0.0204
70	1.6112	1.6178	0.000880	0.0085	22.920	0.0202
71	1.6229	1.6295	0.000888	0.0085	23.416	0.0200
72	1.6346	1.6413	0.000897	0.0085	23.917	0.0197
73	1.6464	1.6531	0.000906	0.0085	24.424	0.0196
74	1.6582	1.6650	0.000915	0.0085	24.935	0.0193
75	1.6700	1.6769	0.000924	0.0085	25.452	0.0192
76	1.6817	1.6888	0.000934	0.0085	25.972	0.0190
77	1.6935	1.7006	0.000947	0.0086	26.498	0.0189
78	1.7051	1.7124	0.000963	0.0087	27.027	0.0188
79	1.7166	1.7240	0.000976	0.0088	27.558	0.0188
80	1.7279	1.7355	0.000987	0.0090	28.090	0.0187
81	1.7390	1.7467	0.000999	0.0093	28.624	0.0188
82	1.7497	1.7575	0.001011	0.0096	29.156	0.0188
83	1.7601	1.7680	0.001022	0.0101	29.687	0.0190
84	1.7700	1.7780	0.001034	0.0109	30.213	0.0193
85	1.7792	1.7873	0.001046	0.0115	30.732	0.0195

Sulphuric Acid—*Continued*

Per cent. H_2SO_4	Sp. gr. app. $\frac{25° C.}{25° C.}$	Sp. gr. app. $\frac{15° C.}{15° C.}$	Correction of specific gravity for 1° C.	Fractional per cent.	Normality. 1 mil requires normal KOH mils.	Per cent. = 0.01 mil normal KOH.
86	1.7879	1.7959	0.001043	0.0127	31.244	0.0199
87	1.7958	1.8038	0.001040	0.0139	31.747	0.0203
88	1.8030	1.8110	0.001035	0.0154	32.240	0.0207
89	1.8095	1.8174	0.001030	0.0172	32.724	0.0211
90	1.8153	1.8231	0.001022	0.0196	33.198	0.0216
91	1.8204	1.8282	0.001032	0.0217	33.662	0.0220
92	1.8250	1.8327	0.001043	0.0256	34.116	0.0225
93	1.8289	1.8365	0.001053	0.0303	34.561	0.0230
94	1.8322	1.8397	0.001064	0.0385	34.995	0.0235
95	1.8348	1.8422	0.001074	0.0526	35.420	0.0244
96	1.8367	1.8440	0.001064	0.1111	35.830	0.0256
97	1.8376	1.8448	0.001054	......	36.221	0.0274
98	1.8372	1.8445	0.001064	0.0555	36.586	0.0297
99	1.8354	1.8427	0.001070	0.0270	36.923	0.0336
100	1.8317	1.8391	0.001074	......	37.221	......

Note that the specific gravity diminishes in acids of more than 97.5 per cent. strength as the percentage increases.

NOTE: To find the per cent. of SO_3, multiply the per cent. of H_2SO_4 by 0.81629. To find the per cent. of SO_4 multiply the per cent. of H_2SO_4 by 0.97941. To find the volume per cent. of official Sulphuric Acid (94 per cent.), multiply the "normality" by 2.857. For the volume per cent. of official Diluted Sulphuric Acid (10 per cent.), multiply the "normality" by 46.10.

Ammonia

Per cent. NH$_3$.	Sp. gr. app. $\frac{25^\circ\text{ C.}}{25^\circ\text{ C.}}$	Sp. gr. app. $\frac{15^\circ\text{ C.}}{15^\circ\text{ C.}}$	Correction of specific gravity for 1° C.*	Fractional per cent.†	Normality. 1 mil requires normal HCl mils.	Per cent. = 0.01 mil normal HCl.
‡0	1.00000	1.00000	0.00017	0.0227	0.000	0.0172
1	0.99560	0.99573	0.00018	0.0230	0.583	0.0173
2	0.99126	0.99151	0.00020	0.0233	1.160	0.0175
3	0.98696	0.98735	0.00021	0.0236	1.733	0.0176
4	0.98272	0.98324	0.00023	0.0239	2.301	0.0178
5	0.97854	0.97918	0.00024	0.0240	2.864	0.0179
6	0.97437	0.97517	0.00026	0.0243	3.422	0.0181
7	0.97025	0.97121	0.00028	0.0246	3.976	0.0182
8	0.96618	0.96730	0.00029	0.0249	4.525	0.0184
9	0.96216	0.96344	0.00030	0.0252	5.069	0.0185
10	0.95819	0.95964	0.00032	0.0267	5.609	0.0186
11	0.95445	0.95604	0.00033	0.0270	6.146	0.0188
12	0.95074	0.95249	0.00035	0.0273	6.679	0.0189
13	0.94708	0.94898	0.00036	0.0276	7.207	0.0190
14	0.94346	0.94551	0.00037	0.0279	7.732	0.0192
15	0.93987	0.94208	0.00039	0.0282	8.253	0.0193
16	0.93633	0.93869	0.00040	0.0286	8.770	0.0195
17	0.93283	0.93533	0.00042	0.0289	9.283	0.0196
18	0.92937	0.93202	0.00043	0.0292	9.793	0.0198
19	0.92594	0.92874	0.00045	0.0295	10.299	0.0199
20	0.92255	0.92550	0.00046	0.0295	10.801	0.0200
21	0.91916	0.92230	0.00047	0.0299	11.300	0.0202
22	0.91581	0.91914	0.00049	0.0301	11.796	0.0204
23	0.91249	0.91601	0.00050	0.0307	12.287	0.0205
24	0.90923	0.91292	0.00052	0.0309	12.776	0.0206
25	0.90599	0.90987	0.00053	0.0317	13.262	0.0207
26	0.90286	0.90685	0.00055	0.0321	13.744	0 0209
27	0.89974	0.90385	0.00057	0.0324	14.223	0.0210
28	0.89665	0.90087	0.00058	0.0326	14.699	0.0212
29	0.89358	0.89791	0.00059	0.0329	15.171	0.0213
30	0.89054	0.89498	0.00060	0.0339	15.640	0.0214
31	0.88759	0.89212	0.00061	0.0353	16.108	0.0214
32	0.88476	0.88938	0.00062	0.0368	16.575	0.0215
33	0.88204	0.88674	0.00063	0.0382	17.040	0.0215
34	0.87942	0.88421	0.00064	0.0394	17.505	0.0216
35	0.87688	0.88176	0.00064	......	17.968	......

* Add if the temperature is above, subtract if it is below, the standard.

† Corresponding with a difference in specific gravity of 0.0001.

‡ The figures in this line across the page are for fractional percentages below 1.

NOTE: To find the per cent. of NH$_4$ multiply the per cent. of NH$_3$ by 1.0592. To find the volume per cent. of official Ammonia Water (10 per cent.) multiply the "normality" by 17.83. For the volume per cent. of official Stronger Ammonia Water (28 per cent.), multiply the "normality" by 6.803.

Reduction of Apparent to True Specific Gravity

viz.: $\frac{25^\circ\ \mathrm{C.}}{25^\circ\ \mathrm{C.}}$ in air to $\frac{25^\circ\ \mathrm{C.}}{25^\circ\ \mathrm{C.}}$ in vacuum.

Weights of Brass, Sp. gr. 8.4. Barometer 760 mm.

Sp. gr. Apparent.	Correction.	Sp. gr. Apparent.	Correction.
0.6	+0.000471	1	0.000000
0.7	+0.000353	2	−0.001177
0.8	+0.000235	3	−0.002355
0.9	+0.000118	4	−0.003532
1.0	0.000000	5	−0.004709
1.1	−0.000118	6	−0.005887
1.2	−0.000235	7	−0.007064
1.3	−0.000353	8	−0.008241
1.4	−0.000471	9	−0.009418
1.5	−0.000589	10	−0.010596
1.6	−0.000706	11	−0.011773
1.7	−0.000824	12	−0.012950
1.8	−0.000942	13	−0.014128
1.9	−0.001060	14	−0.015305
2.0	−0.001177	15	−0.016482

Formula for deriving above correction: Subtract algebraically the apparent specific gravity from 1.000 and multiply the remainder by 0.0011773. It is additive for specific gravities below, subtractive for those above, 1.000.

NOTE: The correction for reducing true to apparent specific gravity is found by subtracting algebraically 1.000 from the true specific gravity and multiplying the remainder by the factor 0.0011765. It is subtractive for specific gravities below, additive for those above, 1.000.

Reduction of Apparent Weight in Air to Weight in Vacuum

Weighings Made with Brass Weights, Temperature 25° C.,* Air One-half Saturated with Moisture,† and Barometer 760 mm.‡

Sp. gr. of object weighed.	Correction in milligrammes for each Gm. of apparent weight.	Sp. gr. of object weighed.	Correction in milligrammes for each Gm. of apparent weight.	Sp. gr. of object weighed.	Correction in milligrammes for each Gm. of apparent weight.
0.60	+1.82	1.25	+0.80	4.5	+0.122
0.62	1.76	1.30	0.77	5	0.096
0.64	1.70	1.35	0.73	6	0.056
0.66	1.64	1.40	0.70	7	0.028
0.68	1.59	1.45	0.67	8	0.007
0.70	+1.54	1.50	+0.65	9	−0.009
0.72	1.50	1.55	0.62	10	0.022
0.74	1.45	1.60	0.60	11	0.034
0.76	1.41	1.65	0.57	12	0.042
0.78	1.37	1.70	0.55	13	0.049
0.80	+1.33	1.75	+0.533	14	−0.056
0.82	1.30	1.80	0.514	15	0.062
0.84	1.26	1.85	0.497	16	0.066
0.86	1.23	1.90	0.480	17	0.071
0.88	1.20	1.95	0.464	18	0.075
0.90	+1.17	2.00	+0.449	19	−0.078
0.92	1.14	2.20	0.395	20	0.081
0.94	1.11	2.40	0.351	21	0.084
0.96	1.09	2.60	0.313	22	0.087
0.98	1.06	2.80	0.281		
1.00	+1.04	3.00	+0.253		
1.05	0.98	3.25	0.222		
1.10	0.93	3.50	0.197		
1.15	0.88	3.75	0.174		
1.20	0.84	4.00	0.154		

* *Temperature correction,* approximate, for temperatures between 15° and 35° C. For each degree (centigrade) 0.37 per cent. of figures in table; additive if below, subtractive if above, 25° C.

† *Humidity correction* varies with temperature; additive if below, subtractive if above, 50 per cent. of saturation. For complete dryness or for full saturation at 15° C., the correction is 0.33 per cent. of figures in the table; at 20° C., 0.44 per cent.; at 25° C., 0.58 per cent.; at 30° C., 0.77 per cent.; and at 35° C., 1.01 per cent.

‡ *Barometer Correction* (important at high altitudes).—For each millimeter 0.132 per cent. of figures in table; additive if above 760 mm., subtractive if below 760 mm.

Note: If weights used are of platinum add 0.085 milligrammes to, and if of aluminum subtract 0.312 milligrammes from, the figures in the table for each gramme.

Calibration of Pycnometers

Apparent Weight in Air of Distilled Water filling "100 Gm." Pycnometer at Various Temperatures.

Barometer 760 mm.† Coefficient of Expansion of Glass 0.000025. Air ½ saturated.

Temperature of water.* C.	Basis 15° C./4° C. in vacuo. (Density) 100 mils	Basis 20° C./4° C. in vacuo. 100 mils	Basis 15° C./15° C. in vacuo.	Basis 20° C./20° C. in vacuo.	Basis 25° C./25° C. in vacuo.	Basis 15° C./15° C. in air.	Basis 15.56° C./15.56° C. in air. (Alcohol Standard)	Basis 20° C./20° C. in air.	Basis 25° C./25° C. in air. (Official)
	Wt. in air.	Wt. in air.	Wt. in air.	Wt. in air.	Wt. in air.	Wt. in air.	Wt. in air.	Wt. in air.	Wt. in air.
15° C.	99.8050	99.7925	99.8923	99.9690	100.0726	100.0000	100.0070	100.0750	100.1768
16° C.	99.7923	99.7798	99.8795	99.9563	100.0598	99.9873	99.9943	100.0622	100.1640
17° C.	99.7784	99.7659	99.8656	99.9424	100.0459	99.9734	99.9804	100.0483	100.1501
18° C.	99.7634	99.7510	99.8506	99.9274	100.0309	99.9584	99.9654	100.0333	100.1351
19° C.	99.7474	99.7349	99.8345	99.9113	100.0148	99.9423	99.9493	100.0172	100.1189
20° C.	99.7302	99.7177	99.8194	99.8941	99.9975	99.9251	99.9321	100.0000	100.1017
21° C.	99.7120	99.6995	99.7991	99.8759	99.9793	99.9068	99.9138	99.9817	100.0834
22° C.	99.6927	99.6802	99.7798	99.8565	99.9600	99.8874	99.8944	99.9623	100.0641
23° C.	99.6724	99.6599	99.7595	99.8362	99.9396	99.8671	99.8741	99.9420	100.0437
24° C.	99.6511	99.6366	99.7382	99.8149	99.9183	99.8458	99.8528	99.9207	100.0224
25° C.	99.6288	99.6164	99.7159	99.7926	99.8959	99.8235	99.8305	99.8983	100.0000
26° C.	99.6056	99.5931	99.6926	99.7693	99.8726	99.8003	99.8173	99.8750	99.9767
27° C.	99.5813	99.5689	99.6684	99.7450	99.8483	99.7761	99.7831	99.8507	99.9524
28° C.	99.5562	99.5438	99.6432	99.7199	99.8231	99.7509	99.7579	99.8255	99.9271
29° C.	99.5302	99.5177	99.6172	99.6937	99.7970	99.7247	99.7317	99.7994	99.9010
30° C.	99.5032	99.4908	99.5902	99.6667	99.7700	99.6976	99.7046	99.7724	99.8739
31° C.	99.4751	99.4630	99.5623	99.6388	99.7421	99.6697	99.6767	99.7445	99.8460
32° C.	99.4467	99.4343	99.5336	99.6102	99.7133	99.6410	99.6480	99.7157	99.8172
33° C.	99.4172	99.4048	99.5041	99.5806	99.6837	99.6114	99.6184	99.6861	99.7876
34° C.	99.3868	99.3744	99.4737	99.5502	99.6533	99.5810	99.5880	99.6557	99.7572
35° C.	99.3557	99.3433	99.4425	99.5190	99.6221	99.5498	99.5568	99.6245	99.7259

* If temperature of air is above that of the water, add for each degree centigrade 0.00041; if below subtract the same amount.

† If barometer (corrected for temperature) is above 760 mm., subtract for each 10 mm. 0.0014; if below add the same amount (see page 653, column 5).

NOTE: When extreme exactness is required the counterpoise of the flask should be of the same kind of glass as that of which the flask is made.

Calibration of Glass Measuring Apparatus

Apparent weight in air of distilled water filling a 100 mil flask at different temperatures. Barometer (corrected for temperature) 760 mm. Coefficient of cubical expansion of glass taken as 0.000025. It is assumed that the weights used are brass and that water and air (one-half saturated with moisture) are at the same temperature.

Temperature. *	Flask holds 100 mils at 15° C.	Flask holds 100 mils at 20° C.	Flask holds 100 mils at 25° C. U. S. P. Standard.	Correction for 10 mils. Barometer above or below 760 mm.†
15° C.	99.8050	99.7925	99.7801	0.00142
16° C.	99.7923	99.7798	99.7673	0.00141
17° C.	99.7784	99.7659	99.7535	0.00141
18° C.	99.7634	99.7510	99.7385	0.00140
19° C.	99.7474	99.7349	99.7224	0.00140
20° C.	99.7302	99.7177	99.7052	0.00140
21° C.	99.7120	99.6995	99.6870	0.00139
22° C.	99.6927	99.6802	99.6678	0.00139
23° C.	99.6724	99.6599	99.6475	0.00138
24° C.	99.6511	99.6386	99.6262	0.00138
25° C.	99.6288	99.6164	99.6039	0.00137
26° C.	99.6056	99.5931	99.5807	0.00137
27° C.	99.5813	99.5689	99.5564	0.00136
28° C.	99.5562	99.5438	99.5313	0.00136
29° C.	99.5302	99.5177	99.5053	0.00136
30° C.	99.5032	99.4908	99.4783	0.00135
31° C.	99.4754	99.4630	99.4505	0.00135
32° C.	99.4467	99.4343	99.4218	0.00134
33° C.	99.4172	99.4048	99.3924	0.00134
34° C.	99.3868	99.3744	99.3620	0.00133
35° C.	99.3557	99.3433	99.3309	0.00133

* If temperature of air is above that of the water, add for each degree centigrade, 0.00041; if below subtract the same amount.

† Barometer correction additive if reading is below 760 mm., subtractive if above.

NOTE: When extreme exactness is required the counterpoise of the flask should be of the same kind of glass as that of which the flask is made.

Metric Equivalents

(Weights)

Kilogrammes.	Avoirdupois pounds.	Avoirdupois ounces.	Apothecaries ounces.	Equivalent avoirdupois.			Grammes.	Grains.
				lbs.	oz.	grs.		
1	2.20462	35.274	32.151	2	3	119.9	1	15.4324
2	4.40924	70.548	64.301	4	6	239.7	2	30.8647
3	6.61387	105.822	96.452	6	9	359.6	3	46.2971
4	8.81849	141.096	128.603	8	13	41.9	4	61.7294
5	11.02311	176.370	160.754	11	0	161.8	5	77.1618
6	13.22773	211.644	192.904	13	3	281.6	6	92.5941
7	15.43236	246.918	225.055	15	6	401.5	7	108.0265
8	17.63698	282.192	257.206	17	10	83.9	8	123.4589
9	19.84160	317.466	289.357	19	13	203.7	9	138.8912
10	22.04622	352.740	321.507	22	0	323.6	10	154.3236

Avoirdupois pounds.	Kilogrammes.	Avoirdupois ounces.	Grammes.	Apothecaries ounces.	Grammes.	Grains.	Grammes.
1	0.453592	1	28.3495	1	31.1035	1	0.06480
2	0.907185	2	56.6991	2	62.2070	2	0.12960
3	1.360777	3	85.0486	3	93.3104	3	0.19440
4	1.814370	4	113.3981	4	124.4139	4	0.25920
5	2.267962	5	141.7476	5	155.5174	5	0.32399
6	2.721555	6	170.0972	6	186.6209	6	0.38879
7	3.175147	7	198.4467	7	217.7244	7	0.45359
8	3.628739	8	226.7962	8	248.8278	8	0.51839
9	4.082332	9	255.1458	9	279.9313	9	0.58319
10	4.535924	10	283.4953	10	311.0348	10	0.64799

Grammes.	Equivalent avoirdupois.		Equivalent Apothecaries		Grammes.	Equivalent avoirdupois.			Equivalent Apothecaries	
	oz.	grains.	oz.	grains.		lbs.	oz.	grs.	oz.	grains.
10	0	154.3	0	154.3	100	0	3	230.7	3	103.2
20	0	308.6	0	308.6	200	0	7	24.0	6	206.5
30	1	25.5	0	463.0	300	0	10	254.7	9	309.7
40	1	179.8	1	137.3	400	0	14	48.0	12	413.0
50	1	334.1	1	291.6	500	1	1	278.7	16	36.2
60	2	50.9	1	445.9	600	1	5	71.9	19	139.4
70	2	205.3	2	120.3	700	1	8	302.6	22	242.6
80	2	359.6	2	274.6	800	1	12	95.9	25	345.9
90	3	76.4	2	428.9	900	1	15	326.6	28	449.1
100	3	230.7	3	103.2	1000	2	3	119.9	32	72.4

Metric Equivalents—*Continued*

(Weights)

Milli-grammes.	Grains.	Approx.	Milli-grammes.	Grains.	Approx.	Milli-grammes.	Grains.	Approx.
0.1	0.00154	1/648	1	0.01543	1/65	10	0.15432	2/13
0.2	0.00309	1/324	2	0.03086	1/33	20	0.30865	10/33
0.3	0.00463	1/216	3	0.04630	1/22	30	0.46297	5/11
0.4	0.00617	1/162	4	0.06173	1/16	40	0.61729	5/8
0.5	0.00772	1/130	5	0.07716	1/13	50	0.77162	23/30
0.6	0.00926	1/108	6	0.09259	1/11	60	0.92594	12/13
0.7	0.01080	1/93	7	0.10803	2/19	70	1.08026	1 1/12
0.8	0.01235	1/81	8	0.12346	1/8	80	1.23459	1 1/4
0.9	0.01389	1/72	9	0.13889	1/7	90	1.38891	1 3/8
1.0	0.01543	1/65	10	0.15432	2/13	100	1.54324	1 1/2

Grains.	Milligrammes.	Grains.	Milligrammes.	Grains.	Milligrammes.
1	64.8	1/12	5.40	1/70	0.93
3/4	48.6	1/16	4.05	1/80	0.81
2/3	43.2	1/20	3.24	1/90	0.72
1/2	32.4	1/24	2.70	1/100	0.65
1/3	21.6	1/25	2.59	1/150	0.43
1/4	16.2	1/30	2.16	1/200	0.32
1/5	13.0	1/35	1.86	1/250	0.26
1/6	10.8	1/40	1.62	1/300	0.22
1/8	8.1	1/50	1.30	1/400	0.16
1/10	6.5	1/60	1.08	1/500	0.13

(Volumes)

Liters.	Gallons.	Pints.	Fluidounces.	Minims.	Equivalent			
					gal.	pt.	fl. oz.	minims.
1	0.26418	2.11342	33.8148	16231.1	0	2	1	391.1
2	0.52836	4.22685	67.6296	32462.2	0	4	3	302.2
3	0.79253	6.34027	101.4444	48693.3	0	6	5	213.3
4	1.05671	8.45370	135.2591	64924.4	1	0	7	124.4
5	1.32089	10.56712	169.0739	81155.5	1	2	9	35.5
6	1.58507	12.68054	202.8870	97386.6	1	4	10	426.6
7	1.84924	14.79397	236.7035	113617.7	1	6	12	337.7
8	2.11342	16.90739	270.5183	129848.8	2	0	14	248.8
9	2.37760	19.02082	304.3306	146079.9	2	3	0	159.9
10	2.64178	21.13424	338.1478	162311.0	2	5	2	71.0

Metric Equivalents—*Continued*

(Volumes)

Mils.	Equivalent	Mils.	Equivalent		Mils.	Equivalent		
	minims.		fl. oz.	minims.		pint.	fl. oz.	minims.
1	16.231	10	0	162.3	100	0	3	183.1
2	32.462	20	0	324.6	200	0	6	366.2
3	48.693	30	1	6.9	300	0	10	69.3
4	64.924	40	1	169.2	400	0	13	252.4
5	81.156	50	1	331.6	500	1	0	435.6
6	97.387	60	2	13.9	600	1	4	138.7
7	113.618	70	2	176.2	700	1	7	321.8
8	129.849	80	2	338.5	800	1	11	24.9
9	146.080	90	3	20.8	900	1	14	208.0
10	162.311	100	3	183.1	1000	2	1	391.1

Gallons.	Mils.	Pints.	Mils.	Fluid-ounces.	Mils.	Minims.	Mils.
1	3785.33	1	473.17	1	29.573	1	0.061610
2	7570.66	2	946.33	2	59.146	2	0.123220
3	11356.00	3	1419.50	3	88.719	3	0.184831
4	15141.33	4	1892.67	4	118.292	4	0.246441
5	18926.66	5	2365.83	5	147.865	5	0.308051
6	22711.99	6	2839.00	6	177.437	6	0.369661
7	26497.33	7	2312.17	7	207.010	7	0.431271
8	30282.66	8	3785.33	8	236.583	8	0.492882
9	34067.99	9	4258.50	9	266.156	9	0.554492
10	37853.32	10	4731.67	10	295.729	10	0.616102

Metric Equivalents—*Continued*

(Length)

Meters.	Yards.	Feet.	Inches.	Equivalent			Kilo-meters.	Miles.
				yds.	feet.	inches.		
1	1.09361	3.28083	39.37	1	0	3.37	1	0.62137
2	2.18722	6.56167	78.74	2	0	6.74	2	1.24274
3	3.28083	9.84250	118.11	3	0	10.11	3	1.86411
4	4.37444	13.12333	157.48	4	1	1.48	4	2.48548
5	5.46806	16.40417	196.85	5	1	4.85	5	3.10685
6	6.56167	19.68500	236.22	6	1	8.22	6	3.72822
7	7.65528	22.96583	275.59	7	1	11.59	7	4.34959
8	8.74889	26.24667	314.96	8	2	2.96	8	4.97096
9	9.84250	29.52750	354.33	9	2	6.33	9	5.59233
10	10.93611	32.80833	393.70	10	2	9.70	10	6.21370

Yards.	Meters.	Feet.	Meters.	Inches.	Centimeters.	Miles.	Kilometers.
1	0.91440	1	0.304801	1	2.5400	1	1.60935
2	1.82880	2	0.609601	2	5.0800	2	3.21869
3	2.74321	3	0.914402	3	7.6200	3	4.82804
4	3.65761	4	1.219202	4	10.1600	4	6.43739
5	4.57201	5	1.524003	5	12.7000	5	8.04674
6	5.48641	6	1.828804	6	15.2400	6	9.65608
7	6.40081	7	2.133604	7	17.7800	7	11.26543
8	7.31521	8	2.438405	8	20.3200	8	12.87478
9	8.22962	9	2.743205	9	22.8600	9	14.48413
10	9.14402	10	3.048006	10	25.4001	10	16.09347

Weight and Volume Relations

Specific gravity true 25° C./25° C.	Specific volume.	Weight of 1 U. S. gallon in pounds avoirdupois in air.	Weight of 100 fluidounces in ounces avoirdupois.	Weight of 1 fluidounce in grains.	Volume in U. S. gallons of 100 lbs. avoirdupois.	Volume in fluidounces of 100 ozs. avoirdupois.	Volume in fluidounces of 1000 grains.
0.70	1.4286	5.816	72.70	318.0	17.195	137.56	3.144
0.71	1.4085	5.899	73.74	322.6	16.953	135.62	3.100
0.72	1.3889	5.982	74.78	327.1	16.717	133.73	3.057
0.73	1.3699	6.065	75.82	331.7	16.487	131.90	3.015
0.74	1.3514	6.149	76.86	336.2	16.264	130.11	2.974
0.75	1.3333	6.232	77.90	340.8	16.047	128.38	2.934
0.76	1.3158	6.315	78.94	345.3	15.836	126.69	2.896
0.77	1.2987	6.398	79.98	349.9	15.630	125.04	2.858
0.78	1.2821	6.481	81.02	354.5	15.429	123.43	2.821
0.79	1.2658	6.565	82.06	359.0	15.233	121.87	2.786
0.80	1.2500	6.648	83.10	363.6	15.043	120.34	2.751
0.81	1.2346	6.731	84.14	368.1	14.857	118.85	2.717
0.82	1.2195	6.814	85.18	372.7	14.675	117.40	2.684
0.83	1.2048	6.897	86.22	377.2	14.496	115.99	2.651
0.84	1.1905	6.981	87.26	381.8	14.325	114.60	2.620
0.85	1.1765	7.064	88.30	386.3	14.157	113.25	2.589
0.86	1.1628	7.147	89.34	390.9	13.992	111.93	2.559
0.87	1.1494	7.230	90.38	395.4	13.831	110.65	2.529
0.88	1.1364	7.314	91.42	400.0	13.673	109.39	2.500
0.89	1.1236	7.397	92.46	404.5	13.520	108.16	2.472
0.90	1.1111	7.480	93.50	409.1	13.369	106.95	2.445
0.91	1.0989	7.563	94.54	413.6	13.222	105.78	2.418
0.92	1.0870	7.646	95.58	418.2	13.078	104.62	2.391
0.93	1.0753	7.730	96.62	422.7	12.937	103.50	2.366
0.94	1.0638	7.813	97.66	427.3	12.799	102.40	2.341
0.95	1.0526	7.896	98.70	431.8	12.666	101.32	2.316
0.96	1.0417	7.979	99.74	436.4	12.532	100.26	2.292
0.97	1.0309	8.063	100.78	440.9	12.403	99.23	2.268
0.98	1.0204	8.146	101.82	445.5	12.276	98.21	2.245
0.99	1.0101	8.229	102.86	450.0	12.152	97.22	2.222
1.00	1.0000	8.312	103.90	454.6	12.031	96.24	2.200
1.02	0.9804	8.479	105.98	463.7	11.794	94.36	2.157
1.04	0.9615	8.645	108.06	472.8	11.567	92.54	2.115
1.06	0.9434	8.812	110.14	481.9	11.349	90.79	2.075
1.08	0.9259	8.978	112.22	491.0	11.138	89.11	2.037
1.10	0.9091	9.144	114.31	500.1	10.936	87.49	2.000
1.12	0.8929	9.311	116.39	509.2	10.740	85.92	1.964
1.14	0.8772	9.477	118.47	518.3	10.552	84.41	1.929
1.16	0.8621	9.644	120.55	527.4	10.370	82.96	1.896
1.18	0.8475	9.810	122.63	536.5	10.194	81.55	1.864

Weight and Volume Relations—*Continued*

Specific gravity true 25° C. / 25° C.	Specific volume.	Weight of 1 U. S. gallon in pounds avoirdupois in air.	Weight of 100 fluidounces in ounces avoirdupois.	Weight of 1 fluidounce in grains.	Volume in U. S. gallons of 100 lbs. avoirdupois.	Volume in fluidounces of 100 ozs. avoirdupois.	Volume in fluidounces of 1000 grains.
1.20	0.8333	9.977	124.71	545.6	10.024	80.19	1.833
1.22	0.8197	10.143	126.79	554.7	9.859	78.87	1.803
1.24	0.8065	10.309	128.87	563.8	9.700	77.60	1.774
1.26	0.7937	10.476	130.95	572.9	9.546	76.37	1.746
1.28	0.7813	10.642	133.03	582.0	9.396	75.17	1.718
1.30	0.7692	10.809	135.11	591.1	9.252	74.01	1.692
1.32	0.7576	10.975	137.19	600.2	9.111	72.89	1.666
1.34	0.7463	11.142	139.27	609.3	8.975	71.80	1.641
1.36	0.7353	11.308	141.35	618.4	8.843	70.75	1.617
1.38	0.7246	11.475	143.43	627.5	8.715	69.72	1.594
1.40	0.7143	11.641	145.51	636.6	8.590	68.72	1.571
1.42	0.7042	11.807	147.59	645.7	8.469	67.75	1.549
1.44	0.6944	11.974	149.67	654.8	8.352	66.81	1.527
1.46	0.6849	12.140	151.75	663.9	8.237	65.90	1.506
1.48	0.6757	12.307	153.83	673.0	8.126	65.01	1.486
1.50	0.6667	12.473	155.92	682.1	8.017	64.13	1.466
1.52	0.6579	12.640	158.00	691.2	7.912	63.29	1.447
1.54	0.6494	12.806	160.08	700.3	7.809	62.47	1.428
1.56	0.6410	12.973	162.16	709.4	7.709	61.67	1.410
1.58	0.6329	13.139	164.24	718.5	7.611	60.89	1.392
1.60	0.6250	13.305	166.32	727.6	7.516	60.13	1.374
1.62	0.6173	13.472	168.40	736.7	7.423	59.38	1.357
1.64	0.6098	13.638	170.48	745.8	7.332	58.66	1.341
1.66	0.6024	13.805	172.56	754.9	7.244	57.95	1.325
1.68	0.5952	13.971	174.64	764.1	7.158	57.26	1.309
1.70	0.5882	14.138	176.72	773.2	7.073	56.59	1.293
1.72	0.5814	14.304	178.80	762.3	6.991	55.93	1.278
1.74	0.5747	14.470	180.88	791.4	6.911	55.29	1.264
1.76	0.5682	14.637	182.96	800.5	6.832	54.66	1.249
1.78	0.5618	14.803	185.04	809.6	6.755	54.04	1.235
1.80	0.5556	14.970	187.12	818.7	6.680	53.44	1.222
1.82	0.5495	15.136	189.20	827.8	6.607	52.85	1.208
1.84	0.5435	15.302	191.28	836.9	6.535	52.28	1.195
1.86	0.5376	15.469	193.36	846.0	6.465	51.72	1.182
1.88	0.5319	15.636	195.44	855.1	6.396	51.17	1.170
1.90	0.5263	15.802	197.53	864.2	6.328	50.63	1.157
1.92	0.5208	15.968	199.61	873.3	6.262	50.10	1.145
1.94	0.5155	16.135	201.69	882.4	6.198	49.58	1.133
1.96	0.5102	16.301	203.77	891.5	6.135	49.08	1.122
1.98	0.5051	16.468	205.85	900.6	6.073	48.58	1.110
2.00	0.5000	16.634	207.93	909.7	6.012	48.09	1.100

Table for Converting Metric Quantities in Pharmaceutical Processes to Quantities in the Avoirdupois System

Table I—Grammes to Grains, etc. (Product measured)

Grammes per liter.	Grains per fluidounce.		Grains, etc., per pint.		Grains, etc., per gallon.		
	Oz. avoir.	Grains.	Ounces avoir.	Grains.	Pounds avoir.	Ounces avoir.	Grains.
1	..	0.46	..	7.3	..	..	58.4
2	..	0.91	..	14.6	..	..	116.8
3	..	1.37	..	21.9	..	..	175.3
4	..	1.83	..	29.2	..	..	233.7
5	..	2.28	..	36.5	..	..	292.1
6	..	2.74	..	43.8	..	..	350.5
7	..	3.19	..	51.1	..	..	408.9
8	..	3.65	..	58.4	..	1	30.0
9	..	4.10	..	65.7	..	1	88.0
10	..	4.56	..	73.0	..	1	147.0
20	..	9.13	..	146.0	..	2	293.0
30	..	13.69	..	219.1	..	4	3.0
40	..	18.26	..	292.1	..	5	149.0
50	..	22.82	..	365.1	..	6	296.0
60	..	27.38	1	0.6	..	8	5.0
70	..	31.95	1	73.7	..	9	152.0
80	..	36.51	1	146.7	..	10	299.0
90	..	41.08	1	219.7	..	12	8.0
100	..	45.64	1	292.7	..	13	154.0
200	..	91.28	3	148.0	1	10	309.0
300	..	136.92	5	3.0	2	8	26.0
400	..	182.56	6	296.0	3	5	180.0
500	..	228.20	8	151.0	4	2	334.0
600	..	273.84	10	6.0	5	0	51.0
700	..	319.47	11	299.0	5	13	204.0
800	..	365.11	13	154.0	6	10	360.0
900	..	410.75	15	10.0	7	8	76.0
1000	1	18.89	16	302.0	8	5	231.0

Example: To make 1 gallon.

Soap Liniment (page 234)

Soap	60 Gm.	(Table I)	8 oz. 5 grs.
Camphor	45 Gm.	" "	40 Gm. 5 oz. 149 grs. 5 Gm. 292.1 grs.
Oil of Rosemary	10 mils	(Table II)	1 fl. oz. 134 min.
Alcohol	700 mils	" "	5 pts. 9 fl. oz. 288 min.
Water, sufficient to make	1000 mils		or 1 gallon

Table for Converting Metric Quantities in Pharmaceutical Processes to Quantities in Apothecaries Measures

Table II—Mils to Minims, etc. (Product measured)

Mils per liter.	Minims per fluidounce.	Minims, etc., per pint.		Minims, etc., per gallon.		
		Fl. oz.	Minims.	Pints.	Fl. oz.	Minims.
1	0.48	..	7.68	..	..	61
2	0.96	..	15.36	..	..	123
3	1.44	..	23.04	..	..	184
4	1.92	..	30.72	..	..	246
5	2.40	..	38.40	..	..	307
6	2.88	..	46.09	..	..	369
7	3.36	..	53.76	..	..	430
8	3.84	..	61.44	..	1	12
9	4.32	..	69.12	..	1	73
10	4.80	..	76.80	..	1	134
20	9.60	..	153.60	..	2	269
30	14.40	..	230.40	..	3	403
40	19.20	..	307.20	..	5	58
50	24.00	..	384.00	..	6	192
60	28.80	..	460.80	..	7	326
70	33.60	1	57.60	..	8	461
80	38.40	1	134.40	..	10	115
90	43.20	1	211.20	..	11	250
100	48.00	1	288.00	..	12	384
200	96.00	3	96.00	1	9	288
300	144.00	4	384.00	2	6	192
400	192.00	6	192.00	3	3	96
500	240.00	8	......	4	..	...
600	288.00	9	288.00	4	12	384
700	336.00	11	96.00	5	9	288
800	384.00	12	384.00	6	6	192
900	432.00	14	192.00	7	3	96
1000	480.00	16	......	8	..	...

Table for Converting Metric Quantities in Pharmaceutical Processes to Quantities in Apothecaries Weights

Table III—Parts per 1000 to Grains, etc., per Pound Avoirdupois

Grammes per kilogramme.	Grains and apothecaries ounces per pound avoirdupois.		Grains and ounces avoirdupois per pound avoirdupois.	
	Ounces.	Grains.	Ounces.	Grains.
1	..	7	..	7.0
2	..	14	..	14.0
3	..	21	..	21.0
4	..	28	..	28.0
5	..	35	..	35.0
6	..	42	..	42.0
7	..	49	..	49.0
8	..	56	..	56.0
9	..	63	..	63.0
10	..	70	..	70.0
20	..	140	..	140.0
30	..	210	..	210.0
40	..	280	..	280.0
50	..	350	..	350.0
60	..	420	..	420.0
70	1	10	1	52.5
80	1	80	1	122.5
90	1	150	1	192.5
100	1	220	1	262.5
200	2	440	3	87.5
300	4	180	4	350.0
400	5	400	6	175.0
500	7	140	8	.....
600	8	360	9	262.5
700	10	100	11	87.5
800	11	320	12	350.0
900	13	60	14	175.0
1000	14	280	16	.....

Example: To make 1 pound avoirdupois.

Camphor Liniment (page 233)

Camphor....................	200 Gm.	(Table III)......	3 oz.	87.5 grs.
Cotton Seed Oil	800 Gm.	" "	12 oz.	350.0 grs.
To make.............	1000 Gm.		or 1 pound avoirdupois	

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